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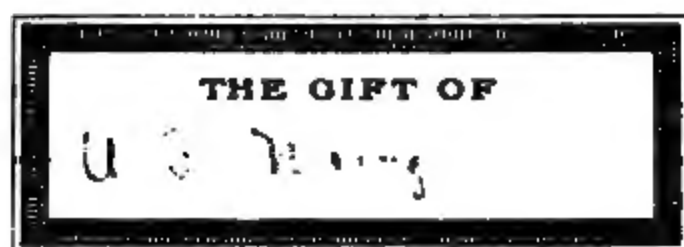
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*U. S. Nautical Almanac Office*  
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THE  
AMERICAN EPHEMERIS  
AND  
NAUTICAL ALMANAC

FOR THE YEAR

1917

PUBLISHED BY THE NAUTICAL ALMANAC OFFICE, U. S.  
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# U. S. NAVAL OBSERVATORY.

Captain J. A. HOOGWERFF, *U. S. N.*, *Superintendent.*

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NOTE.—Those whose names are printed in italics devote only a small portion of their time to work of the Nautical Almanac Office.

October, 1914.



## PREFACE.

---

This volume of the *American Ephemeris and Nautical Almanac* was prepared under the immediate supervision of Professor W. S. EICHELBERGER, U. S. N., the Director. The character of the matter herein contained and its arrangement are the same as in the preceding volume.

This is the second volume to be issued under the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911.

The naval appropriation bill approved August 22, 1912, contained the following:

The Secretary of the Navy is hereby authorized to arrange for the exchange of data with such foreign almanac offices as he may from time to time deem desirable, with a view to reducing the amount of duplication of work in preparing the different national nautical and astronomical almanacs and increasing the total data which may be of use to navigators and astronomers available for publication in the *American Ephemeris and Nautical Almanac*: *Provided*, That any such arrangement shall be terminable on one year's notice: *Provided further*, That the work of the Nautical Almanac Office during the continuance of any such arrangement shall be conducted so that in case of emergency the entire portion of the work intended for the use of navigators may be computed by the force employed by that office, and without any foreign cooperation whatsoever: *Provided further*, That any employee of the Nautical Almanac Office who may be authorized in any annual appropriation bill and whose services in whole or in part can be spared from the duty of preparing for publication the annual volumes of the *American Ephemeris and Nautical Almanac* may be employed by said office in the duty of improving the tables of the planets, moon, and stars, to be used in preparing for publication the annual volumes of the office: *Provided further*, That section four hundred and thirty-five, Revised Statutes, is hereby repealed.

The volume, as in previous years, is divided into three parts, as follows:

Part I, *Ephemeris for the Meridian of Greenwich*, which gives the ephemerides of the Sun and Moon, the geocentric and heliocentric positions of the major planets, and other fundamental astronomical data for equidistant intervals of Greenwich mean time.

Part II, *Ephemeris for the Meridian of Washington*, which gives ephemerides of 825 stars, Sun, Moon, and major planets, for transit over the meridian of the Naval Observatory, Washington, which passes midway between the West and East Transit Circles of the Observatory. The mean places of the fixed stars and the data for their reduction are also included in Part II.

Part III, *Phenomena*, which contains predictions of phenomena to be observed, with data for their computation. Greenwich mean time is used throughout this part except with the occultations visible at Washington where Washington time is used. Tables for the determination of latitude and azimuth from Polaris, tables for the conversion of time, and an alphabetical list of observatories, with their latitudes, longitudes, and other data, are contained in this part.

The Greenwich ephemerides of the Sun, Moon, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune were furnished by the office of the *British Nautical Almanac*.

The Greenwich ephemeris of Mercury, the elements of Saturn's rings, the elongations of Saturn's satellites, and the apparent places for Greenwich transit of 518 ten-day stars were furnished by the office of the *Berliner Jahrbuch*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I-IV and the apparent places for Greenwich transit of 38 circumpolar stars were furnished by the office of the *Connaissance des Temps*.

The apparent places for Greenwich transit of 121 ten-day stars were furnished by the office of the *Almanaque Nautico*.

The apparent places for Greenwich transit of 137 ten-day stars were furnished by the office of the *Annuario Astronomico di Torino*.

In accordance with the recommendations of the *Congrès International des Éphémérides Astronomiques*, most of the material furnished from abroad is based upon tables prepared in the American Nautical Almanac Office. In the Introduction are mentioned the various tables upon which the different ephemerides are based.

The following computations were made by the American Nautical Almanac Office:

In Part I, all the hourly and daily variations for the quantities furnished from abroad except in the case of the right ascension and declination of the Moon.

In Part II, the quantities used in computing the apparent places of the stars from their mean places; the mean place list; the interpolation of the apparent places of 814 stars from transit at Greenwich

to transit at Washington; the apparent places of 11 stars; the interpolation of the ephemerides of the Sun, Moon, and planets from Greenwich noon to transit at Washington; the stellar magnitudes of the planets.

In Part III, the data relating to the eclipses of the Sun and Moon; the data relating to the occultations of stars by the Moon; the ephemerides for physical observations of the Sun, Moon, Mars, and Jupiter; the elements of the illuminated disks of Mercury and Venus; the stellar magnitudes of the planets; the data concerning the satellites of Uranus, Neptune, the fifth, sixth, and seventh satellites of Jupiter, and the ninth satellite of Saturn; the diagrams of all the satellite orbits; the position angle and distance tables of the satellites of Saturn; the list of phenomena; the list of observatories with their geographical coordinates; and the tables for the determination of latitude and azimuth from observations of Polaris.

All computations made in the American Nautical Almanac Office and those received from the other offices were subjected to checks to insure absence of errors.

J. A. HOOGEWERFF,  
*Captain, U. S. Navy,*  
*Superintendent Naval Observatory.*

U. S. NAVAL OBSERVATORY, *October, 1914.*



# CONTENTS.

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	Page.
Errata . . . . .	viii
Introduction . . . . .	ix
Anniversaries and Festivals . . . . .	xvi
Chronological Eras and Cycles . . . . .	xvii
Astronomical Constants . . . . .	xviii
Symbols and Abbreviations . . . . .	xx

## PART I—EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Ephemeris of the Sun . . . . .	2
Ephemeris of the Moon . . . . .	26
Phases of the Moon . . . . .	117
Ephemerides of the Planets Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune . . . . .	134

## PART II—EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

BESSEL'S Formulæ for Star-Reductions . . . . .	200
Besselian and Independent Star-Numbers . . . . .	202
Nutation, Terms of Short Period in the . . . . .	215
Mean Places of 790 Standard Stars for 1917.0 . . . . .	217
Mean Places of 35 Circumpolar Stars for 1917.0 . . . . .	231
Apparent Places of 35 Circumpolar Stars . . . . .	232
Apparent Places of 790 Standard Stars . . . . .	316
Ephemeris of the Sun for Apparent Noon . . . . .	514
Moon-Culminations . . . . .	522
Transit-Ephemerides of the Planets Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune . . . . .	538

## PART III—PHENOMENA.

Eclipses . . . . .	556
Mean Places of Stars Occulted by the Moon . . . . .	564
Elements for the Prediction of Occultations . . . . .	569
Occultations Visible at Washington . . . . .	611
Ephemeris for Physical Observations of the Sun . . . . .	614
Moon, Mean Equator, Orbit, and Mean Longitude . . . . .	615
Ephemeris for Physical Observations of the Moon . . . . .	616
Disks of Mercury and Venus . . . . .	624
Ephemeris for Physical Observations of Mars . . . . .	626
Ephemeris for Physical Observations of Jupiter . . . . .	628
Satellites of Jupiter, Saturn, Uranus, and Neptune . . . . .	632
Phenomena, Planetary Configurations . . . . .	672
Positions of Observatories . . . . .	674
Problems in Lunar Distances . . . . .	684

## TABLES.

Table I—For Finding the Latitude by an Observed Altitude of Polaris . . . . .	685
Table Ia—Auxiliary Table of Corrections for Latitudes other than 45° . . . . .	689
Table II—Sidereal into Mean Solar Time . . . . .	690
Table III—Mean Solar into Sidereal Time . . . . .	693
Table IV—Azimuth of Polaris at all Hour Angles . . . . .	696
Table IVa—Correction for Declination . . . . .	701
Table V—Azimuth of Polaris at Elongation . . . . .	702
Table Va—For Reduction of Observations Near Elongation . . . . .	707
Table VI—For Finding the Times of Upper and Lower Culmination of Polaris . . . . .	708
Table VII—Apparent Place, Upper Culmination, and Elongations, of Polaris . . . . .	709
On the Arrangement and Use of <i>The American Ephemeris and Nautical Almanac</i> . . . . .	711
Index to Apparent Places of Stars . . . . .	738
General Index . . . . .	741

# ERRATA.

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*The American Ephemeris, 1916.*

Page.									
141	Dec. 32, Var. per Hour of Right Ascension	.	.	.	for	+11°.878	read	+11°.874	
743	Moon, Longitude, Mean, Page	.	.	.	for	118	read	611	
743	Moon, Longitude, True, Page	.	.	.	for	611	read	118	
744	Parallax, Horizontal, of Jupiter, Page	.	.	.	for	134,538	read	174,548	

# INTRODUCTION.

---

The ephemeris of the Sun is constructed from NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1.

The adopted value of the mean equatorial horizontal parallax of the Sun is 8''.80, *Paris Conference, May, 1896*.

The Sun's rectangular equatorial coordinates are computed from the longitudes and latitudes by the following formulæ:

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R \sin \lambda \cos \omega - 19.3 R \beta \\ Z &= R \sin \lambda \sin \omega + 44.5 R \beta \end{aligned}$$

The reductions to mean equinox are computed by the formulæ—

$$\begin{aligned} \Delta X &= + Y \sec \omega \Delta \lambda \sin 1'' \\ \Delta Y &= -X \cos \omega \Delta \lambda \sin 1'' + Z \Delta \omega \sin 1'' + 9.1 \tau R \sin (\lambda + 6^\circ) \\ \Delta Z &= -X \sin \omega \Delta \lambda \sin 1'' - Y \Delta \omega \sin 1'' - 21.0 \tau R \sin (\lambda + 6^\circ) \end{aligned}$$

where the numerical coefficients are in units of the seventh place of decimals and

- $R$  = the Sun's distance from the Earth,
- $\lambda$  = the Sun's true longitude,
- $\beta$  = the Sun's true latitude, expressed in seconds of arc,
- $\omega$  = the obliquity of the ecliptic,
- $\Delta \lambda$  = the reduction of longitude for precession and nutation from the beginning of the Besselian fictitious year,
- $\Delta \omega$  = the reduction of the mean to the apparent obliquity,
- $\tau$  = the fraction of the year since the beginning of the Besselian fictitious year.

The longitude, latitude, and parallax of the Moon are derived from HANSEN'S *Tables de la Lune* (London, 1857), the mean longitude being corrected as in previous years, beginning with the volume for the year 1883. The statement concerning these corrections which is contained in the volumes from 1883 to 1911, inclusive, is erroneous, in that they have not been computed strictly in accordance with the formula in NEWCOMB'S *Researches on the Motion of the Moon*, part 1, page 268, *Washington Observations*, 1875, Appendix II. That formula is,

$$-1''.14 - 29''.17 T - 3''.86 T^2 - V_2 - 0''.09 \sin A - 15''.49 \cos A,$$

while the expression actually used is,

$$-1''.14 - 29''.17 T - 3''.76 T^2 - V_2 - 15''.49 \cos A.$$

In these formulæ  $T$  is the time in units of 100 years reckoned from 1800.

The ephemerides of Mercury, Venus, and Mars are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VI, parts 2, 3, and 4.

The ephemerides of Jupiter and Saturn are derived from the tables constructed in this office by GEORGE W. HILL, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 1 and 2.



The ephemerides of Uranus and Neptune are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 3 and 4.

The nutation used in computing the ephemerides of the Sun, Moon, and planets has been taken from Tables XXXII and XXXIII of NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1. The formulæ from which this nutation is computed are as follows, the time interval T being expressed in units of 100 years, reckoned from 1900. See *Tables of the Sun*, page 26.

$$\begin{array}{ll} \delta\psi = -(17''.234 + 0''.017 T) \sin \Omega & \delta\epsilon = +9''.214 \cos \Omega \\ + 0''.209 \sin 2 \Omega & - 0''.090 \cos 2 \Omega \\ - 1''.257 \sin 2 L & + 0''.546 \cos 2 L \\ - 0''.049 \sin (3 L + 78^\circ.7) & + 0''.021 \cos (3 L + 78^\circ.7) \\ + 0''.110 \sin (L + 75^\circ.3) & - 0''.009 \cos (L - 78^\circ.7) \end{array}$$

The formulæ for the nutation used in computing the Besselian and Independent Star Numbers are as follows:

Terms of Long Period.	Terms of Short Period.
$\delta\psi = -(17''.234 + 0''.017 T) \sin \Omega$	$- 0''.204 \sin 2 \mathcal{C}$
$+ 0''.209 \sin 2 \Omega$	$+ 0''.011 \sin (\mathcal{C} + \Gamma')$
$- 1''.272 \sin 2 L$	$+ 0''.068 \sin (\mathcal{C} - \Gamma')$
$+ 0''.126 \sin (L - \Gamma)$	$- 0''.034 \sin (2 \mathcal{C} - \Omega)$
$- 0''.050 \sin (3 L - \Gamma)$	$- 0''.026 \sin (3 \mathcal{C} - \Gamma')$
$+ 0''.021 \sin (L + \Gamma)$	$+ 0''.015 \sin (\mathcal{C} - 2 L + \Gamma')$
$+ 0''.012 \sin (2 L - \Omega)$	$+ 0''.006 \sin 2 (\mathcal{C} - L)$
$\delta\epsilon = + (9''.210 + 0''.0009 T) \cos \Omega$	$+ 0''.088 \cos 2 \mathcal{C}$
$- 0''.090 \cos 2 \Omega$	$+ 0''.018 \cos (2 \mathcal{C} - \Omega)$
$+ 0''.551 \cos 2 L$	$+ 0''.011 \cos (3 \mathcal{C} - \Gamma')$
$+ 0''.022 \cos (3 L - \Gamma)$	$- 0''.005 \cos (\mathcal{C} + \Gamma')$
$- 0''.009 \cos (L + \Gamma)$	
$- 0''.007 \cos (2 L - \Omega)$	

The meaning of the symbols used and the manner in which these latter formulæ have been employed in computing the ephemerides of the stars are explained on pages 200 and 201. The slight discrepancy between the terms in  $2 L$  in these two sets of formulæ is due to the correction of an error in the first set. See *Bulletin Astronomique*, 1898, Vol. XV, page 244.

The list of 825 stars contained in Part II has been selected from NEWCOMB'S *Catalogue of Fundamental Stars, Astronomical Papers of the American Ephemeris*, Vol. VIII, part 2.

In general, the names of the stars are the same as in NEWCOMB'S Suggested List of Fundamental Stars, except that the FLAMSTEED number has been omitted in all cases where Greek or italic letters are available. In some cases the constellation and number of the uranometries of HEIS or GOULD have been used. In all such cases, H<sup>1</sup> or the letter G precedes the constellation name, as, for example, 5 H<sup>1</sup>. Cassiopeiæ and 38 G. Horologii.

The magnitudes of the stars have, with a few exceptions, been taken from *Annals of the Harvard College Observatory*, Vol. L, 1908.

The spectral classification has been furnished by the Harvard College Observatory. The notation is that of *Annals of Harvard College Observatory*, Vol. LVI.

The mean places, annual variations, and annual proper motions of the stars have been taken from NEWCOMB'S Catalogue, except that those of  $\epsilon$  Hydri, 38 G. Horologii, and  $\pi$  Centauri have been taken from *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33.

The values of  $\Delta\alpha$  and  $\Delta\delta$  which are given for the companions to the stars  $\gamma$  Andromedæ,  $\alpha^1$  Crucis,  $\zeta^1$  Ursæ Majoris and 61 Cygni, have been taken from BOSS'S *Preliminary General Catalogue*, and those for  $\alpha^2$  Geminorum from DOBERCK'S elements given in the *Astronomische Nachrichten*, 1904, vol. 166, page 145.

The formulæ for the computation of the Besselian and Independent Star Numbers are given on page 200, the coefficients being those given by NEWCOMB in *Bulletin Astronomique*, 1898, Vol. XV, page 241.

The terms of short period of the nutation, depending on the Moon's mean longitude, have been computed from the formulæ for these terms given above.

The method by which the right ascensions and declinations of the stars interpolated from the 10-day ephemerides are corrected for the effect of these short-period terms is given on page 201.

According to the formulæ on pages 200 and 201 the star constants  $a, b, c, d, a', b', c', d'$  are computed for each star from its mean place at the beginning of the year, but if strict accuracy is required they should be computed from the star's mean place at date, and the following second-order terms should be added to the usual expressions for the reduction from mean to apparent place, namely—

To $\alpha - \alpha_0$	To $\delta - \delta_0$
$\begin{aligned} &+0.000\ 003\ \tau^2\ \sin\ \alpha \Big\} \tan\ \delta \\ &-0.000\ 149\ \tau^2\ \cos\ \alpha \Big\} \\ &-0.000\ 0650\ \tau^2\ \sin\ 2\alpha \Big\} \tan^2\ \delta \\ &+0.000\ 0103\ \sin\ 2\ \odot\ \cos\ 2\alpha \Big\} \\ &-0.000\ 0107\ \cos\ 2\ \odot\ \sin\ 2\alpha \Big\} \\ &+0.000\ 0620\ \sin\ 2\ \odot\ \cos\ 2\alpha \Big\} \sec^2\ \delta \\ &-0.000\ 0622\ \cos\ 2\ \odot\ \sin\ 2\alpha \Big\} \\ &+0.000\ 0513\ \sin\ (\odot + \odot) \cos\ 2\alpha \Big\} \tan\ \delta \sec\ \delta \\ &-0.000\ 0507\ \cos\ (\odot + \odot) \sin\ 2\alpha \Big\} \\ &+0.000\ 0097\ \sin\ (\odot - \odot) \cos\ 2\alpha \Big\} \\ &-0.000\ 0053\ \cos\ (\odot - \odot) \sin\ 2\alpha \Big\} \end{aligned}$	$\begin{aligned} &+0.000\ 975\ \tau^2\ \sin^2\ \alpha \\ &-0.000\ 023\ \cos\ 2\ \odot \\ &-0.000\ 080\ \cos\ 2\ \odot\ \cos\ 2\alpha \Big\} \tan\ \delta \\ &-0.000\ 077\ \sin\ 2\ \odot\ \sin\ 2\alpha \Big\} \\ &+0.000\ 040\ \cos\ 2\ \odot \\ &-0.000\ 467\ \cos\ 2\ \odot\ \cos\ 2\alpha \Big\} \\ &-0.000\ 465\ \sin\ 2\ \odot\ \sin\ 2\alpha \Big\} \\ &-0.000\ 039\ \cos\ (\odot + \odot) \\ &-0.000\ 380\ \cos\ (\odot + \odot) \cos\ 2\alpha \Big\} \sin\ \delta \tan\ \delta \\ &-0.000\ 385\ \sin\ (\odot + \odot) \sin\ 2\alpha \Big\} \\ &-0.000\ 380\ \cos\ (\odot - \odot) \\ &-0.000\ 040\ \cos\ (\odot - \odot) \cos\ 2\alpha \Big\} \\ &-0.000\ 072\ \sin\ (\odot - \odot) \sin\ 2\alpha \Big\} \end{aligned}$

These terms are negligible for stars whose declination is numerically less than  $80^\circ$ , but in computing the apparent places given in the American Ephemeris they have been applied whenever sensible.

The *apparent* places of seven stars have been corrected for the effect of annual parallax. These stars, with the adopted values of the annual parallax, are—

$\tau$ Ceti . . . . .	0.31	$\alpha$ Centauri . . . . .	0.75
$\epsilon$ Eridani . . . . .	0.32	$\alpha$ Aquilæ (Altair) . . . . .	0.23
$\alpha$ Canis Majoris (Sirius) . . . . .	0.38	61 Cygni . . . . .	0.30
$\alpha$ Canis Minoris (Procyon) . . . . .	0.33		

The *apparent* places of  $\alpha$  Canis Majoris (Sirius),  $\alpha$  Canis Minoris (Procyon), and  $\alpha^2$  Centauri have been corrected for the effect of orbital motion. AUWERS'S

elements were used for Sirius and Procyon, and SEE's elements for  $\alpha^2$  Centauri. The values of these corrections are given on pages 98 and 99 of *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33, but those for Sirius and Procyon need an additional correction to refer them to the center of the orbit before they are applicable to the mean places taken from NEWCOMB's Fundamental Catalogue. These additional corrections for Sirius and Procyon were omitted in the *Star List of the American Ephemeris* [*Supplement to the American Ephemeris and Nautical Almanac*] for 1910 and 1911, and in the *American Ephemeris and Nautical Almanac* for 1912 and 1913. The values of the corrections for the three stars are—

	Sirius.		Procyon.		$\alpha^2$ Centauri.	
	1917.0	1918.0	1917.0	1918.0	1917.0	1918.0
$\Delta\alpha$	−0 <sup>s</sup> .143	−0 <sup>s</sup> .143	−0 <sup>s</sup> .062	−0 <sup>s</sup> .061	+0 <sup>s</sup> .647	+0 <sup>s</sup> .634
$\Delta\delta$	−0 <sup>′</sup> .59	−0 <sup>′</sup> .72	+0 <sup>′</sup> .05	+0 <sup>′</sup> .18	+5 <sup>′</sup> .98	+5 <sup>′</sup> .70

These corrections have not been applied to the mean places as published in this volume.

The stars occulted by the Moon have been selected from the *Catalogue of Zodiacal Stars* contained in Vol. VIII, part 3, *Astronomical Papers of the American Ephemeris*, and the mean places for 1917.0 have been derived from the same catalogue.

In Part III the elements of eclipses of the Sun and occultations of stars by the Moon are given in accordance with BESSEL's method, the special forms employed being a modification of those developed in CHAUVENET's *Spherical and Practical Astronomy*.

In the computation of the elements of Eclipses, the following corrections to the longitude, latitude, and parallax of the Moon, deduced by NEWCOMB from recent observations of occultations of stars by the Moon, *Astronomical Papers of the American Ephemeris*, Vol. IX, part 1, have been applied. These corrections have been assumed in each case to be constant during the eclipse.

G. M. T.	$\delta v$	$\delta b$	$\delta \pi$
1917	"	"	"
Jan. 7 <sup>d</sup> 20 <sup>h</sup>	+8.4	+1.3	+0.40
Jan. 22 20	+7.6	0.0	+0.50
June 19 1	+6.3	+1.3	+0.43
July 4 10	+7.0	0.0	+0.48
July 18 15	+6.6	+1.6	+0.41
Dec. 13 21	+7.5	−0.1	+0.46
Dec. 27 22	+7.8	+1.4	+0.44

The elongations of the satellites of Mars are derived from elements given by H. STRUVE in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.

The conjunctions and phenomena of Jupiter's four brighter satellites are derived from SAMPSON's tables. The configurations are derived from a continuation of DAMOISEAU's tables by M. POTTIER.

The elongations of the Vth satellite of Jupiter are derived from unpublished elements deduced from the observations of BARNARD.

The differential coordinates of Jupiter's VIth and VIIth satellites are derived from elements and tables given in *Lick Observatory Bulletin*, 1906, Vol. IV, No. 112, and in *Astronomische Nachrichten*, 1907, Vol. 174, page 359, respectively.

The positions of the rings and the elongations and conjunctions of the satellites of Saturn are derived from elements given by H. STRUVE in *Observations de Poulkova*, Supplement 1, St. Petersburg, 1888; *Publications de Poulkovo*, Second Series, Vol. XI, St. Petersburg, 1898; with corrections communicated by H. STRUVE to the *Berliner Jahrbuch*. The differential coordinates of Phœbe are derived from elements and tables given in *Annals of Harvard College Observatory*, 1905, Vol. LIII, No. VI.

The apparent outer dimensions ( $a$  and  $b$ ) of the rings of Saturn are also according to STRUVE; the relative dimensions of the rings are computed from BESSEL's data, except those for the dusky ring, which are based on the observations of various astronomers.

The elongations of Ariel and Umbriel, the inner satellites of Uranus, are derived from the data of NEWCOMB's *Uranian and Neptunian Systems*, *Washington Observations*, 1873, Appendix I. The elongations of Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. STRUVE in *Abhandlungen der K. Preussischen Akademie der Wissenschaften*, 1912.

The elongations of the satellite of Neptune are derived from elements given by A. HALL in the *Astronomical Journal*, 1898, Vol. XIX, page 65.

The adopted apparent semidiameter of the Sun at the Earth's mean distance is  $16' 1''.50$ , while in the computation of eclipses the value given by AUWERS in the *Astronomische Nachrichten*, 1891, Vol. 128, page 367, is employed, viz.,  $15' 59''.63$ .

In the computation of the ephemeris for physical observations of the Sun the following elements by CARRINGTON have been used:

Inclination of the Sun's equator to the ecliptic . . . . .	$7^{\circ} 15'$
Longitude of the ascending node of the Sun's equator on the ecliptic . . . . .	$73^{\circ} 40' + 50''.25 (t - 1850)$
Sidereal period of rotation (mean solar days) . . . . .	$25^d.38$

The apparent semidiameter of the Moon is computed from the Moon's equatorial horizontal parallax,  $\pi$ , by the formula,

$$S = 0.272\,506\,\pi + 1''.50$$

where the constant 0.272 506 is based on data from occultations given by J. PETERS in the *Astronomische Nachrichten*, 1895, Vol. 138, page 147; and the constant  $1''.50$  is added to cover the average effect of irradiation.

The value of the Moon's semidiameter employed in the computation of eclipses is computed from the formula,

$$\sin S = 0.272\,274 \sin \pi$$

In the computation of the ephemeris for physical observations of the Moon, the following notation and formulæ have been used, the value of  $I$  and the formulæ for physical libration being those given by F. HAYN in *Abhandlungen der K. Sächsischen Gesell. der Wissenschaften*, Vols. 29 and 30, 1904, 1907:

$I$  = the inclination of the Moon's mean equator to the ecliptic ( $= 1^{\circ} 32'.1$ ),

$\Omega$  = the longitude of the ascending node of the Moon's orbit, or the longitude of the descending node of the Moon's mean equator,

$C$  = the angle at the center of the Moon's disk made by a lunar meridian with the circle of declination, counted from north to east,

$\lambda, \beta, \alpha, \delta$  = the geocentric longitude, latitude, right ascension, and declination of the Moon,

$i$  = the inclination of the Moon's mean equator to the Earth's true equator,  
 $d$  = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic,  
 $\Omega'$  = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator,  
 $\mathcal{C}$  = the Moon's mean longitude, referred to the mean equinox,  
 $g'$  = the Earth's mean anomaly,  
 $g$  = the Moon's mean anomaly,  
 $\omega$  = the angular distance of the perigee of the Moon's orbit from its ascending node on the ecliptic,  
 $b, l$  = the optical librations in latitude and longitude, respectively,  
 $\delta b, \delta l$  = the physical librations in latitude and longitude, respectively,  
 $b + \delta b$  = the Moon's geocentric libration in latitude = the Earth's selenographic latitude,  
 $l + \delta l$  = the Moon's geocentric libration in longitude = the Earth's selenographic longitude,  
 $\delta C$  = the physical libration of  $C$ ,  
 $\mu = -0'.617 \sin 2(\Omega - \lambda)$ ,  
 $A = \sin I \cos(\Omega - \lambda)$ ,  
 $\tan B = \tan I \sin(\Omega - \lambda)$ ,  
 $\lambda' = \lambda + \mu + Ab$ ,  
 $b = B - \beta$ ,  
 $l = \lambda' - \mathcal{C}$ ,  
 $\sin C' = \sin i \frac{\cos(\lambda' + d - \Omega)}{\cos \delta} = -\sin i \frac{\cos(\alpha - \Omega')}{\cos b}$ ,  
 $\delta b = +108'' \sin(\omega + l) + 37'' \sin(\omega - l) - 11'' \sin(g + \omega - l)$ ,  
 $\delta l = +12'' \sin g - 59'' \sin g' - 18'' \sin 2\omega$ ,  
 $-[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \tan b$ ,  
 $\delta C = -[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \sec b$ ,  
 $C = C' + \delta C$ .

The Sun's selenographic latitude and longitude have been computed from formulæ the same as those given above except that the heliocentric coordinates of the Moon have been substituted for the geocentric coordinates.

The following elements have been used in computing the ephemerides for physical observations of the planets Mars and Jupiter:

Position of north pole of Mars	. . . . .	$\begin{cases} \alpha = 21^h 10^m 0^s + 1^s.565(t-1905) \\ \delta = 54^\circ 30' 0'' + 12''.60(t-1905) \end{cases}$
Position of north pole of Jupiter	. . . . .	$\begin{cases} \alpha = 17^h 52^m 0^s.84 + 0^s.247(t-1910) \\ \delta = 64^\circ 33' 34''.6 - 0''.60(t-1910) \end{cases}$
Rotation period of Mars	. . . . .	$24^h 37^m 22^s.65$
Rotation period of Jupiter	$\begin{cases} \text{System I.} \\ \text{System II.} \end{cases}$	$\begin{cases} 9^h 50^m 30^s.004 \\ 9^h 55^m 40^s.632 \end{cases}$
Longitude of Central Meridian of Mars, May 15, 1897, Greenwich Mean Noon	. . . . .	$52^\circ.01$
Longitude of Central Meridian of Jupiter (System I.), July 14, 1897, Greenwich Mean Noon	. . . . .	$47^\circ.31$
Longitude of Central Meridian of Jupiter (System II.), July 14, 1897, Greenwich Mean Noon	. . . . .	$96^\circ.58$

The position of the north pole of Mars is as given by LOWELL and CROMMELIN (see *Monthly Notices R. A. S.*, 1905, Vol. 66, page 56), while that of the north pole of Jupiter has been deduced from the position given by DAMOISEAU for 1750 (see *Tables Écliptiques des Satellites de Jupiter*, page (1)). The rotation periods of Mars and of Jupiter and the longitudes of the central meridians are according to MARTIN (see *Monthly Notices R. A. S.*, 1896, Vol. 56, pages 395-403 and 517-524). The longitude of the Great Red Spot and the time of its transit across the Central Meridian given in the volumes for 1913 and 1914

have been replaced by those of System II. of MARTH. This change has been made in view of the following facts: The Paris Conference of October, 1911, assigned to the office of the American Ephemeris and Nautical Almanac the preparation of the ephemerides for the physical observations of the planets; a general desire exists that the use of System II. of MARTH should not be discontinued; and the position of the Great Red Spot during the opposition of 1912 was about  $70^\circ$  from the place predicted from the elements adopted in the *American Ephemeris and Nautical Almanac* for 1913.

The adopted semidiameters of the planets, with the authority for each, are given on page xix. Their stellar magnitudes have been computed from formulæ given by G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 1893, Vol. 8, page 366.

In the list of observatories the authority for the various positions is given in each case. The latitudes given are in most cases astronomical. In some instances they have been determined by geodetic triangulation from other points. The reductions from geographic to geocentric latitude,  $\varphi' - \varphi$ , and the distance from the center of the earth,  $\rho$ , are computed from the formulæ on page xviii, using the flattening  $\frac{1}{297}$  obtained by JOHN F. HAYFORD in *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy*, U. S. Coast and Geodetic Survey, 1910, and adopted by the *Paris Conference*, October, 1911.



## ANNIVERSARIES AND FESTIVALS, 1917.

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<b>New Year's Day</b>	.	.	.	.	.	.	.	<b>Monday,</b>	<b>Jan.</b>	<b>1.</b>
<b>Epiphany</b>	.	.	.	.	.	.	.	<b>Saturday,</b>	<b>Jan.</b>	<b>6.</b>
<b>Septuagesima Sunday</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>Feb.</b>	<b>4.</b>
<b>Lincoln's Birthday</b>	.	.	.	.	.	.	.	<b>Monday,</b>	<b>Feb.</b>	<b>12.</b>
<b>Quinquagesima (Shrove Sunday)</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>Feb.</b>	<b>18.</b>
<b>Ash Wednesday</b>	.	.	.	.	.	.	.	<b>Wednesday,</b>	<b>Feb.</b>	<b>21.</b>
<b>Washington's Birthday</b>	.	.	.	.	.	.	.	<b>Thursday,</b>	<b>Feb.</b>	<b>22.</b>
<b>Palm Sunday</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>Apr.</b>	<b>1.</b>
<b>Good Friday</b>	.	.	.	.	.	.	.	<b>Friday,</b>	<b>Apr.</b>	<b>6.</b>
<b>First Day of Passover</b>	.	.	.	.	.	.	.	<b>Saturday,</b>	<b>Apr.</b>	<b>7.</b>
<b>Easter Sunday</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>Apr.</b>	<b>8.</b>
<b>Rogation Sunday</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>May</b>	<b>13.</b>
<b>Ascension Day (Holy Thursday)</b>	.	.	.	.	.	.	.	<b>Thursday,</b>	<b>May</b>	<b>17.</b>
<b>Hebrew Pentecost (Shebuoth)</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>May</b>	<b>27.</b>
<b>Pentecost (Whit Sunday)</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>May</b>	<b>27.</b>
<b>Memorial Day</b>	.	.	.	.	.	.	.	<b>Wednesday,</b>	<b>May</b>	<b>30.</b>
<b>Trinity Sunday</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>June</b>	<b>3.</b>
<b>Corpus Christi</b>	.	.	.	.	.	.	.	<b>Thursday,</b>	<b>June</b>	<b>7.</b>
<b>Independence Day</b>	.	.	.	.	.	.	.	<b>Wednesday,</b>	<b>July</b>	<b>4.</b>
<b>Labor Day (except in certain States)</b>	.	.	.	.	.	.	.	<b>Monday,</b>	<b>Sept.</b>	<b>3.</b>
<b>Hebrew New Year (Rosh Hashanah)</b>	.	.	.	.	.	.	.	<b>Monday,</b>	<b>Sept.</b>	<b>17.</b>
<b>Day of Atonement (Yom Kippur)</b>	.	.	.	.	.	.	.	<b>Wednesday,</b>	<b>Sept.</b>	<b>26.</b>
<b>First Day of Tabernacle (Sucoth)</b>	.	.	.	.	.	.	.	<b>Monday,</b>	<b>Oct.</b>	<b>1.</b>
<b>Election Day (in certain States)</b>	.	.	.	.	.	.	.	<b>Tuesday,</b>	<b>Nov.</b>	<b>6.</b>
<b>Thanksgiving Day</b>	.	.	.	.	.	.	.	<b>Thursday,</b>	<b>Nov.</b>	<b>29.</b>
<b>First Sunday in Advent</b>	.	.	.	.	.	.	.	<b>Sunday,</b>	<b>Dec.</b>	<b>2.</b>
<b>Christmas Day</b>	.	.	.	.	.	.	.	<b>Tuesday,</b>	<b>Dec.</b>	<b>25.</b>



# CHRONOLOGICAL ERAS AND CYCLES.

## CHRONOLOGICAL ERAS.

THE YEAR 1917, WHICH COMPRISES THE LATTER PART OF THE 141ST AND THE BEGINNING OF THE 142D YEAR OF THE INDEPENDENCE OF THE UNITED STATES OF AMERICA, CORRESPONDS TO—

- The year 6630 of the Julian period;
- “ 7425–7426 of the Byzantine era, the year 7426 commencing on September 1;
- “ 5677–5678 of the Jewish era, the year 5678 commencing on September 17, or, more exactly, at sunset on September 16;
- “ 2670 since the foundation of Rome, according to VARRO;
- “ 2664 since the beginning of the era of NABONASSAR, which has been assigned to Wednesday, the 26th of February of the 3967th year of the Julian Period; corresponding in the notation of chronologists, to the 747th, and, in the notation of astronomers, to the 746th year before the birth of CHRIST;
- “ 2693 of the Olympiads, or the first year of the 674th Olympiad, commencing in July, 1917, if we fix the era of the Olympiads at 775½ years before CHRIST, or near the beginning of July of the year 3938 of the Julian period;
- “ 2229 of the Grecian era, or the era of the SELEUCIDÆ, which began near the vernal equinox of the year,  $-311 = \text{B. C. } 312, = 4402$  of the Julian period;
- “ 1633 of the era of DIOCLETIAN;
- “ 2577 of the Japanese era and to the 6th year of the period entitled Taisho.

The year 1336 of the Mohammedan era, or the era of the Hegira, begins on the 17th day of October, 1917.

The first day of January of the year 1917 is the 2,421,230th day since the commencement of the Julian Period.

## CHRONOLOGICAL CYCLES.

Dominical Letter . . . . .	G	Solar Cycle . . . . .	22
Epact . . . . .	6	Roman Indiction.. . . .	15
Lunar Cycle or Golden Number	18	Julian Period . . . . .	6630

# ASTRONOMICAL CONSTANTS.

Solar Parallax . . . . .	8.80	} Paris Conference.
Constant of Nutation . . . . .	9.21	
Constant of Aberration . . . . .	20.47	
General Precession . . . . .	$50''.2564 + 0''.000\ 222(t-1900)$	} Newcomb.
Obliquity of the Ecliptic . . . . .	$23^{\circ}\ 27'\ 8''.26 - 0''.4684(t-1900)$	
Equatorial Horizontal Parallax of the Moon . . . . .	$57'\ 2''.63^*$	(Newcomb)

Mean distance Earth to Moon 384 411 kilometers=238 862 miles, or 60.2678 radii.

Mean distance Earth to Sun 149 504 201 kilometers=92 897 416 statute miles.

Velocity of light 299 860 kilometers=186 324 statute miles per second (Newcomb and Michelson).

Light travels unit distance in 498<sup>s</sup>.580.

Gaussian Gravitation Constant,  $\dagger k=0.017\ 202\ 099=3\ 548''.187\ 61$ .

Acceleration in one second due to gravity,  $g=9.8060 - 0.0260 \cos 2\varphi - \frac{2h}{R}g.\dagger$

Length of seconds pendulum,  $l=0.993\ 549 - 0.002\ 631 \cos 2\varphi - \frac{2h}{R}l.\dagger$  } Helmert.

Length of the year:

Tropical (ordinary) . . . . .	$365.242\ 198\ 79 - 0.000\ 000\ 0614(t-1900)$	} Newcomb.
Sidereal . . . . .	$365.256\ 360\ 42 + 0.000\ 000\ 0011(t-1900)$	
Anomalistic . . . . .	$365.259\ 641\ 34 + 0.000\ 000\ 0304(t-1900)$	
Eclipse . . . . .	$346.620\ 000 + 0.000\ 000\ 36(t-1900)$	

Length of the month:

Synodical (ordinary) . . . . .	$29.530\ 588 = 29\ 12\ 44\ 2.8$	} Hansen.
Tropical . . . . .	$27.321\ 582 = 27\ 7\ 43\ 4.7$	
Sidereal . . . . .	$27.321\ 661 = 27\ 7\ 43\ 11.5$	
Anomalistic . . . . .	$27.554\ 550 = 27\ 13\ 18\ 33.1$	
Nodical . . . . .	$27.212\ 219 = 27\ 5\ 5\ 35.7$	

Length of the day:

Sidereal . . . . .	$23\ 56\ 4.091$ of mean solar time.
Mean Solar . . . . .	$24\ 3.56.555$ of sidereal time.

Dimensions of the Earth (Hayford's Spheroid of 1909):

Equatorial Radius,  $a=6378.388$  kilometers or 3963.34 statute miles.

Polar Radius,  $b=6356.909$  " or 3949.99 " "

Flattening,  $\frac{a-b}{a} = \frac{1}{297.0}$

Logarithm of the eccentricity  $\frac{\sqrt{a^2-b^2}}{a} = \log e = 8.913\ 804$

Logarithm radius= $\log \rho = 9.999\ 2695 + 0.000\ 7324 \cos 2\varphi - 0.000\ 0019 \cos 4\varphi$ .

Reduction from geographic latitude  $\varphi$  to geocentric latitude  $\varphi'$ ,

$$\varphi' - \varphi = -11'\ 35''.66 \sin 2\varphi + 1''.17 \sin 4\varphi.$$

1 meter=3.280 8333 feet. 1 foot=0.304 8006 meters.

1 statute mile=0.868 362 nautical or geographical miles.

1 nautical mile=1.151 594 statute miles.

\* Used in the computation of eclipses. The parallax used in the computation of the ephemeris of the Moon contained in this volume is  $57'\ 2''.23$  (Hansen).

$\dagger k^2$  is the acceleration due to the Sun's attraction at the mean distance of the Earth from the Sun, which is also the astronomical unit of distance, the unit of time being one mean solar day.

$\dagger \varphi$  = latitude,  $h$  = elevation above sea level in meters, and  $\log R = 6.80416$ .

NOTE.—The above values of  $\log \rho$  and  $\varphi' - \varphi$  were computed with the eccentricity that results from assuming that the flattening of the earth is exactly  $\frac{1}{297}$ .

# ASTRONOMICAL CONSTANTS.

## SEMIDIAMETERS OF THE SUN, MOON, AND PLANETS.

Name.	At Unit Distance. " "	At Mean Least Distance. "	In Kilo-meters.	In Statute Miles.	Authority.
Sun . . . . .	15 59.63	. .	695 553.46	432 196.01	Auwers.
Moon . . . . .	15 32.58*	. .	1 738.02	1 079.96	Newcomb.
Mercury . . . . .	3.34	5.45	2 420.89	1 504.27	Le Verrier.
Venus . . . . .	8.55	30.90	6 197.18	3 850.74	Peirce.
Mars . . . . .	5.05	9.64	3 660.32	2 274.42	Peirce.
Jupiter (Equatorial) . . . . .	1 40.20	23.84	72 626.64	45 128.01	Am. Eph.
Jupiter (Polar) . . . . .	1 34.12	22.40	68 219.76	42 389.71	Peirce.
Saturn (Equatorial) . . . . .	1 24.88	9.94	61 522.45	38 228.20	Barnard.
Saturn (Polar) . . . . .	1 17.47	9.07	56 151.56	34 890.89	Barnard.
Uranus . . . . .	33.52	1.84	24 295.86	15 096.72	Am. Eph.
Neptune . . . . .	38.66	1.33	28 021.42	17 411.67	Am. Eph.

## ELEMENTS OF THE PLANETARY ORBITS FOR THE EPOCH 1917 —January 0<sup>d</sup> (G. M. T.

Name.	Mean Dis-tance.	Sidereal Period in Tropical Years.	Sidereal Mean Daily Motion. "	Synodic Period in Tropical Years.	Eccen-tricity.
♿ Mercury . . . . .	0.387 099	0.240 85	14 732.420	0.317 26	0.205 6177
♀ Venus . . . . .	0.723 331	0.615 21	5 767.670	1.598 72	0.006 8126
⊕ Earth . . . . .	1.000 000	1.000 04	3 548.193	. . .	0.016 7439
♂ Mars . . . . .	1.523 688	1.880 89	1 886.519	2.135 39	0.093 3244
♃ Jupiter . . . . .	5.202 803	11.862 23	299.128	1.092 11	0.048 3653
♄ Saturn . . . . .	9.538 843	29.457 72	120.455	1.035 18	0.055 8310
♅ Uranus . . . . .	19.190 978	84.015 29	42.23	1.012 09	0.047 0922
♆ Neptune . . . . .	30.070 672	164.788 29	21.53	1.006 14	0.008 5441

Name.	Inclina-tion to the Ecliptic. " ' "	Mean Longi-tude of the Node. " ' "	Mean Longi-tude of the Perihelion. " ' "	Mean Longi-tude at the Epoch. " ' "	Logarithm of Mass in Unit of Sun's Mass.
♿ Mercury . . . . .	7 0 11.5	47 20 50.7	76 9 50.9	27 44 52.89	3.221 8487—10
♀ Venus . . . . .	3 23 37.7	75 55 57.5	130 24 11.4	210 37 57.16	4.389 3398—10
⊕ Earth . . . . .	. . . . .	. . . . .	101 30 47.1	99 34 51.57	4.482 2896—10
♂ Mars . . . . .	1 51 0.9	48 55 1.4	334 31 53.0	307 42 19.72	3.509 5499—10
♃ Jupiter . . . . .	1 18 28.1	99 36 35.2	12 59 7.6	34 12 1.58	6.979 9082—10
♄ Saturn . . . . .	2 29 29.8	112 55 54.7	91 25 18.3	114 33 12.34	6.455 7335—10
♅ Uranus . . . . .	0 46 22.0	73 34 32.6	169 19 14.1	316 26 34.40	5.640 7528—10
♆ Neptune . . . . .	1 46 39.4	130 51 56.8	43 54 15.2	122 24 2.19	5.705 5338—10

The elements of the four inner planets are derived from those given by NEWCOMB in Vol. VI of the *Astronomical Papers of the American Ephemeris*, and are the same as those used in computing the ephemerides of these planets. Those of Jupiter, Saturn, Uranus, and Neptune are taken from Vol. VII of the *Astronomical Papers* for the epoch of the tables. They are reduced to 1917 by applying LE VERRIER's variations, and can not be regarded as being strictly identical with the elements used in computing the ephemerides of those planets in this volume.

\* At mean distance. See *Ast. Papers Am. Eph.*, Vol. IX, p. 39. For the values of the semidiameter used in this volume see page xiii.

# SYMBOLS AND ABBREVIATIONS.

## SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
♁	The Earth.	♆	Neptune.

## SIGNS OF THE ZODIAC.

Spring Signs.	1.	♈	Aries.	Autumn Signs.	7.	♎	Libra.
	2.	♉	Taurus.		8.	♏	Scorpius.
	3.	♊	Gemini.		9.	♐	Sagittarius.
Summer Signs.	4.	♋	Cancer.	Winter Signs.	10.	♑	Capricornus.
	5.	♌	Leo.		11.	♒	Aquarius.
	6.	♍	Virgo.		12.	♓	Pisces.

## ASPECTS.

- ♌ Conjunction, or having the same Longitude or Right Ascension.
- ☐ Quadrature, or differing  $\pm 90^\circ$  in Longitude or Right Ascension.
- ♌ Opposition, or differing  $180^\circ$  in Longitude or Right Ascension.

## ABBREVIATIONS.

♈	Ascending Node.	°	Degrees.
♏	Descending Node.	'	Minutes of Arc.
N.	North.	"	Seconds of Arc.
S.	South.	h	Hours.
E.	East.	m	Minutes of Time.
W.	West.	s	Seconds of Time.

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# PART I.

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## ASTRONOMICAL EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Jan. 1	Mo	18 45 50.11	11.041	—23 1 56.7	+12.09	16 17.87	8.95	— 3 34.47	—1.184	18 42 15.64
2	Tu	18 50 14.92	11.026	22 56 52.8	13.23	16 17.88	8.95	4 2.72	1.170	18 46 12.20
3	We	18 54 39.37	11.011	22 51 21.6	14.37	16 17.88	8.95	4 30.61	1.154	18 50 8.75
4	Th	18 59 3.42	10.994	22 45 23.2	15.50	16 17.88	8.95	4 58.11	1.137	18 54 5.31
5	Fr	19 3 27.06	10.976	22 38 57.7	16.62	16 17.87	8.95	5 25.19	1.119	18 58 1.87
6	Sa	19 7 50.25	10.957	—22 32 5.4	+17.74	16 17.85	8.95	— 5 51.83	—1.100	19 1 58.43
7	Su	19 12 12.98	10.937	22 24 46.4	18.84	16 17.83	8.95	6 17.99	1.080	19 5 54.99
8	Mo	19 16 35.22	10.916	22 17 1.0	19.94	16 17.80	8.95	6 43.67	1.059	19 9 51.54
9	Tu	19 20 56.94	10.894	22 8 49.3	21.03	16 17.77	8.95	7 8.83	1.037	19 13 48.10
10	We	19 25 18.12	10.871	22 0 11.6	22.11	16 17.73	8.95	7 33.46	1.015	19 17 44.66
11	Th	19 29 38.75	10.848	—21 51 8.2	+23.18	16 17.68	8.95	— 7 57.53	—0.991	19 21 41.22
12	Fr	19 33 58.80	10.823	21 41 39.2	24.24	16 17.63	8.95	8 21.02	0.967	19 25 37.78
13	Sa	19 38 18.25	10.798	21 31 44.9	25.28	16 17.57	8.95	8 43.92	0.941	19 29 34.33
14	Su	19 42 37.09	10.772	21 21 25.7	26.32	16 17.51	8.95	9 6.20	0.915	19 33 30.89
15	Mo	19 46 55.30	10.745	21 10 41.7	27.34	16 17.44	8.95	9 27.85	0.888	19 37 27.45
16	Tu	19 51 12.85	10.717	—20 59 33.3	+28.35	16 17.36	8.95	— 9 48.84	—0.861	19 41 24.01
17	We	19 55 29.73	10.689	20 48 0.8	29.35	16 17.28	8.94	10 9.17	0.833	19 45 20.57
18	Th	19 59 45.93	10.660	20 36 4.4	30.34	16 17.20	8.94	10 28.81	0.804	19 49 17.12
19	Fr	20 4 1.42	10.631	20 23 44.6	31.31	16 17.11	8.94	10 47.75	0.774	19 53 13.68
20	Sa	20 8 16.20	10.601	20 11 1.7	32.27	16 17.02	8.94	11 5.97	0.744	19 57 10.24
21	Su	20 12 30.25	10.570	—19 57 55.9	+33.21	16 16.92	8.94	—11 23.45	—0.713	20 1 6.79
22	Mo	20 16 43.54	10.538	19 44 27.8	34.13	16 16.82	8.94	11 40.19	0.681	20 5 3.35
23	Tu	20 20 56.06	10.506	19 30 37.7	35.04	16 16.72	8.94	11 56.15	0.649	20 8 59.91
24	We	20 25 7.80	10.473	19 16 25.9	35.94	16 16.61	8.94	12 11.33	0.616	20 12 56.47
25	Th	20 29 18.74	10.439	19 1 52.9	36.81	16 16.51	8.94	12 25.72	0.583	20 16 53.02
26	Fr	20 33 28.87	10.405	—18 46 59.0	+37.67	16 16.39	8.94	—12 39.29	—0.549	20 20 49.58
27	Sa	20 37 38.18	10.371	18 31 44.7	38.51	16 16.28	8.94	12 52.05	0.514	20 24 46.14
28	Su	20 41 46.66	10.336	18 16 10.4	39.34	16 16.16	8.93	13 3.97	0.479	20 28 42.69
29	Mo	20 45 54.31	10.302	18 0 16.4	40.15	16 16.03	8.93	13 15.06	0.445	20 32 39.25
30	Tu	20 50 1.13	10.267	17 44 3.2	40.95	16 15.91	8.93	13 25.32	0.410	20 36 35.80
31	We	20 54 7.10	10.231	—17 27 31.1	+41.72	16 15.77	8.93	—13 34.74	—0.375	20 40 32.36
Feb. 1	Th	20 58 12.23	10.196	17 10 40.7	42.48	16 15.64	8.93	13 43.32	0.340	20 44 28.92
2	Fr	21 2 16.53	10.162	16 53 32.2	43.23	16 15.49	8.93	13 51.06	0.305	20 48 25.47
3	Sa	21 6 20.00	10.127	16 36 6.0	43.95	16 15.35	8.93	13 57.97	0.271	20 52 22.03
4	Su	21 10 22.63	10.092	16 18 22.6	44.66	16 15.19	8.93	14 4.05	0.236	20 56 18.58
5	Mo	21 14 24.44	10.058	—16 0 22.3	+45.36	16 15.03	8.92	—14 9.31	—0.202	21 0 15.14
6	Tu	21 18 25.44	10.025	15 42 5.6	46.03	16 14.87	8.92	14 13.75	0.168	21 4 11.70
7	We	21 22 25.63	9.991	15 23 32.8	46.70	16 14.70	8.92	14 17.38	0.135	21 8 8.25
8	Th	21 26 25.02	9.958	15 4 44.3	47.34	16 14.53	8.92	14 20.21	0.101	21 12 4.81
9	Fr	21 30 23.61	9.925	14 45 40.5	47.97	16 14.35	8.92	14 22.25	0.069	21 16 1.36
10	Sa	21 34 21.43	9.893	—14 26 21.8	+48.58	16 14.16	8.92	—14 23.51	—0.036	21 19 57.92
11	Su	21 38 18.48	9.861	14 6 48.7	49.18	16 13.98	8.91	14 24.00	—0.004	21 23 54.47
12	Mo	21 42 14.76	9.829	13 47 1.5	49.76	16 13.79	8.91	14 23.73	+0.027	21 27 51.03
13	Tu	21 46 10.30	9.799	13 27 0.5	50.32	16 13.59	8.91	14 22.72	0.058	21 31 47.58
14	We	21 50 5.11	9.769	13 6 46.3	50.86	16 13.39	8.91	14 20.97	0.088	21 35 44.14
15	Th	21 53 59.20	9.739	—12 46 19.2	+51.39	16 13.18	8.91	—14 18.50	+0.118	21 39 40.69
16	Fr	21 57 52.57	9.709	—12 25 39.6	+51.90	16 12.97	8.90	—14 15.32	+0.147	21 43 37.25

SUN, 1917.

3

FOR GREENWICH MEAN NOON



FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s	
Feb. 16	Fr	21	57	52.57	9.709	−12	25	39.6	+51.90	16	12.97	8.90	−14 15.32	+0.147	21	43	37.25
17	Sa	22	1	45.24	9.690	12	4	48.0	52.40	16	12.76	8.90	14 11.44	0.176	21	47	33.81
18	Su	22	5	37.23	9.652	11	43	44.7	52.87	16	12.55	8.90	14 6.87	0.204	21	51	30.36
19	Mo	22	9	28.54	9.624	11	22	30.3	53.33	16	12.34	8.90	14 1.63	0.232	21	55	26.91
20	Tu	22	13	19.19	9.596	11	1	5.1	53.77	16	12.12	8.90	13 55.72	0.260	21	59	23.47
21	We	22	17	9.17	9.569	−10	39	29.7	+54.19	16	11.90	8.90	−13 49.15	+0.287	22	3	20.02
22	Th	22	20	58.51	9.543	10	17	44.3	54.59	16	11.68	8.89	13 41.94	0.314	22	7	16.57
23	Fr	22	24	47.22	9.516	9	55	49.5	54.97	16	11.46	8.89	13 34.09	0.340	22	11	13.13
24	Sa	22	28	35.29	9.490	9	33	45.8	55.33	16	11.24	8.89	13 25.61	0.366	22	15	9.68
25	Su	22	32	22.76	9.465	9	11	33.6	55.68	16	11.01	8.89	13 16.53	0.391	22	19	6.24
26	Mo	22	36	9.63	9.440	−8	49	13.2	+56.01	16	10.78	8.88	−13 6.84	+0.416	22	23	2.79
27	Tu	22	39	55.91	9.416	8	26	45.1	56.33	16	10.55	8.88	12 56.57	0.440	22	26	59.34
28	We	22	43	41.63	9.393	8	4	9.6	56.62	16	10.32	8.88	12 45.73	0.463	22	30	55.90
Mar. 1	Th	22	47	26.80	9.371	7	41	27.3	56.90	16	10.09	8.88	12 34.34	0.485	22	34	52.45
2	Fr	22	51	11.43	9.349	7	18	38.4	57.17	16	9.85	8.88	12 22.43	0.507	22	38	49.01
3	Sa	22	54	55.56	9.328	−6	55	43.4	+57.41	16	9.61	8.87	−12 10.00	+0.528	22	42	45.56
4	Su	22	58	39.19	9.308	6	32	42.7	57.64	16	9.37	8.87	11 57.08	0.548	22	46	42.11
5	Mo	23	2	22.36	9.289	6	9	36.6	57.86	16	9.13	8.87	11 43.69	0.567	22	50	38.67
6	Tu	23	6	5.07	9.271	5	46	25.4	58.06	16	8.88	8.87	11 29.86	0.586	22	54	35.22
7	We	23	9	47.36	9.254	5	23	9.6	58.25	16	8.63	8.87	11 15.59	0.603	22	58	31.77
8	Th	23	13	29.25	9.237	−4	59	49.5	+58.42	16	8.38	8.86	−11 0.92	+0.619	23	2	28.33
9	Fr	23	17	10.75	9.221	4	36	25.5	58.58	16	8.12	8.86	10 45.87	0.635	23	6	24.88
10	Sa	23	20	51.89	9.207	4	12	58.0	58.72	16	7.86	8.86	10 30.45	0.650	23	10	21.43
11	Su	23	24	32.69	9.193	3	49	27.2	58.85	16	7.59	8.86	10 14.70	0.663	23	14	17.99
12	Mo	23	28	13.18	9.181	3	25	53.5	58.96	16	7.33	8.85	9 58.64	0.675	23	18	14.54
13	Tu	23	31	53.38	9.169	−3	2	17.4	+59.05	16	7.06	8.85	−9 42.29	+0.687	23	22	11.09
14	We	23	35	33.31	9.159	2	38	39.1	59.13	16	6.79	8.85	9 25.67	0.698	23	26	7.64
15	Th	23	39	13.00	9.149	2	14	59.1	59.20	16	6.52	8.85	9 8.80	0.708	23	30	4.20
16	Fr	23	42	52.46	9.140	1	51	17.7	59.26	16	6.24	8.84	8 51.71	0.716	23	34	0.75
17	Sa	23	46	31.73	9.132	1	27	35.2	59.29	16	5.97	8.84	8 34.42	0.724	23	37	57.30
18	Su	23	50	10.81	9.125	−1	3	52.0	+59.31	16	5.69	8.84	−8 16.95	+0.731	23	41	53.86
19	Mo	23	53	49.73	9.119	0	40	8.6	59.31	16	5.42	8.84	7 59.32	0.738	23	45	50.41
20	Tu	23	57	28.51	9.113	−0	16	25.2	59.30	16	5.14	8.83	7 41.55	0.743	23	49	46.96
21	We	0	1	7.17	9.108	+0	7	17.6	59.27	16	4.86	8.83	7 23.65	0.748	23	53	43.52
22	Th	0	4	45.71	9.104	0	30	59.5	59.22	16	4.59	8.83	7 5.64	0.752	23	57	40.07
23	Fr	0	8	24.16	9.101	+0	54	40.2	+59.16	16	4.31	8.83	−6 47.54	+0.756	0	1	36.62
24	Sa	0	12	2.54	9.098	1	18	19.2	59.09	16	4.04	8.82	6 29.36	0.759	0	5	33.17
25	Su	0	15	40.85	9.095	1	41	56.2	58.99	16	3.77	8.82	6 11.12	0.761	0	9	29.73
26	Mo	0	19	19.12	9.094	2	5	30.6	58.88	16	3.49	8.82	5 52.84	0.762	0	13	26.28
27	Tu	0	22	57.36	9.093	2	29	2.3	58.76	16	3.22	8.82	5 34.53	0.763	0	17	22.83
28	We	0	26	35.59	9.093	+2	52	30.8	+58.62	16	2.95	8.81	−5 16.20	+0.763	0	21	19.39
29	Th	0	30	13.83	9.094	3	15	55.8	58.46	16	2.68	8.81	4 57.89	0.763	0	25	15.94
30	Fr	0	33	52.10	9.095	3	39	16.9	58.29	16	2.41	8.81	4 39.60	0.761	0	29	12.49
31	Sa	0	37	30.41	9.096	4	2	33.8	58.11	16	2.14	8.81	4 21.36	0.759	0	33	9.05
Apr. 1	Su	0	41	8.79	9.101	4	25	46.1	57.91	16	1.87	8.80	4 3.19	0.755	0	37	5.60
2	Mo	0	44	47.26	9.105	+4	48	53.5	+57.70	16	1.60	8.80	−3 45.11	+0.751	0	41	2.15
3	Tu	0	48	25.83	9.110	+5	11	55.7	+57.48	16	1.32	8.80	−3 27.13	+0.747	0	44	58.70

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ' "	"	"			"	"	"	23° 27' "	h m s
Feb. 16	47	327 16 11.4	151.40	-0.23	9.994 8457	+33.9	6.41	+17.55	20.71	3.36	2 16 0.41
17	48	328 16 44.4	151.36	-0.10	9.994 9397	39.4	6.55	17.54	20.70	3.37	2 12 4.50
18	49	329 17 16.2	151.29	+0.04	9.995 0349	39.9	6.68	17.52	20.70	3.38	2 8 8.59
19	50	330 17 46.6	151.24	0.18	9.995 1311	40.3	6.82	17.51	20.70	3.39	2 4 12.68
20	51	331 18 15.5	151.18	0.31	9.995 2281	40.6	6.96	17.49	20.69	3.39	2 0 16.78
21	52	332 18 43.0	151.11	+0.42	9.995 3259	+40.9	7.10	+17.47	20.69	3.40	1 56 20.87
22	53	333 19 8.9	151.04	0.52	9.995 4244	41.2	7.23	17.45	20.68	3.41	1 52 24.96
23	54	334 19 33.0	150.97	0.59	9.995 5235	41.5	7.37	17.43	20.68	3.41	1 48 29.05
24	55	335 19 55.3	150.89	0.63	9.995 6234	41.8	7.51	17.41	20.67	3.42	1 44 33.14
25	56	336 20 15.8	150.81	0.63	9.995 7239	42.1	7.65	17.39	20.67	3.43	1 40 37.23
26	57	337 20 34.2	150.72	+0.60	9.995 8254	+42.5	7.78	+17.36	20.66	3.43	1 36 41.33
27	58	338 20 50.6	150.64	0.55	9.995 9278	42.9	7.92	17.34	20.66	3.44	1 32 45.42
28	59	339 21 5.0	150.56	0.47	9.996 0312	43.3	8.06	17.31	20.65	3.44	1 28 49.51
Mar. 1	60	340 21 17.4	150.47	0.36	9.996 1358	43.8	8.20	17.29	20.65	3.44	1 24 53.60
2	61	341 21 27.6	150.39	0.26	9.996 2415	44.3	8.33	17.26	20.64	3.44	1 20 57.69
3	62	342 21 35.9	150.30	+0.15	9.996 3486	+44.9	8.47	+17.23	20.64	3.45	1 17 1.79
4	63	343 21 42.0	150.21	+0.02	9.996 4569	45.4	8.61	17.20	20.63	3.45	1 13 5.88
5	64	344 21 46.2	150.13	-0.11	9.996 5667	46.0	8.75	17.17	20.63	3.45	1 9 9.97
6	65	345 21 48.3	150.05	0.22	9.996 6779	46.6	8.88	17.13	20.62	3.45	1 5 14.06
7	66	346 21 48.4	149.96	0.32	9.996 7904	47.2	9.02	17.10	20.62	3.45	1 1 18.16
8	67	347 21 46.5	149.88	-0.40	9.996 9044	+47.8	9.16	+17.07	20.61	3.45	0 57 22.25
9	68	348 21 42.7	149.80	0.46	9.997 0198	48.4	9.30	17.03	20.61	3.45	0 53 26.34
10	69	349 21 37.1	149.73	0.49	9.997 1365	48.9	9.43	17.00	20.60	3.45	0 49 30.44
11	70	350 21 29.6	149.65	0.49	9.997 2546	49.5	9.57	16.96	20.59	3.45	0 45 34.53
12	71	351 21 20.2	149.58	0.46	9.997 3740	50.0	9.71	16.92	20.59	3.44	0 41 38.62
13	72	352 21 9.2	149.50	-0.41	9.997 4946	+50.5	9.85	+16.89	20.58	3.44	0 37 42.71
14	73	353 20 56.3	149.43	0.33	9.997 6162	50.8	9.99	16.85	20.58	3.43	0 33 46.81
15	74	354 20 41.8	149.36	0.28	9.997 7386	51.2	10.12	16.81	20.57	3.43	0 29 50.90
16	75	355 20 25.6	149.29	-0.11	9.997 8619	51.5	10.26	16.77	20.57	3.42	0 25 54.99
17	76	356 20 7.8	149.22	+0.03	9.997 9857	51.7	10.40	16.74	20.56	3.42	0 21 59.09
18	77	357 19 48.2	149.15	+0.16	9.998 1099	+51.8	10.54	+16.70	20.55	3.41	0 18 3.18
19	78	358 19 26.9	149.08	0.29	9.998 2343	51.9	10.67	16.66	20.55	3.40	0 14 7.27
20	79	359 19 3.8	149.00	0.42	9.998 3588	51.8	10.81	16.62	20.54	3.39	0 10 11.36
21	80	0 18 39.0	148.92	0.52	9.998 4831	51.8	10.95	16.58	20.54	3.38	0 6 15.45
22	81	1 18 12.2	148.84	0.59	9.998 6072	51.7	11.09	16.54	20.53	3.37	{ 0 2 19.55 23 58 23.64
23	82	2 17 43.4	148.76	+0.63	9.998 7310	+51.5	11.22	+16.50	20.52	3.36	23 54 27.73
24	83	3 17 12.6	148.67	0.64	9.998 8544	51.3	11.36	16.46	20.52	3.35	23 50 31.83
25	84	4 16 39.7	148.58	0.62	9.998 9774	51.2	11.50	16.43	20.51	3.34	23 46 35.92
26	85	5 13 4.6	148.49	0.57	9.999 1001	51.1	11.64	16.39	20.51	3.33	23 42 40.01
27	86	6 15 27.2	148.39	0.50	9.999 2226	51.0	11.77	16.35	20.50	3.32	23 38 44.11
28	87	7 14 47.5	148.31	+0.41	9.999 3450	+51.0	11.91	+16.31	20.50	3.30	23 34 48.20
29	88	8 14 5.5	148.21	0.30	9.999 4672	50.9	12.05	16.27	20.49	3.29	23 30 52.29
30	89	9 13 21.2	148.11	0.18	9.999 5894	51.0	12.19	16.24	20.48	3.27	23 26 56.38
31	90	10 12 34.6	148.01	+0.06	9.999 7118	51.0	12.32	16.20	20.48	3.26	23 23 0.48
Apr. 1	91	11 11 45.7	147.91	-0.06	9.999 8342	51.0	12.46	16.16	20.47	3.24	23 19 4.57
2	92	12 10 54.5	147.82	-0.17	9.999 9568	+51.1	12.60	+16.13	20.47	3.23	23 15 8.66
3	93	13 10 1.0	147.73	-0.27	0.000 0797	+51.2	12.74	+16.09	20.46	3.21	23 11 12.75

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h	m	s	s	°	'	"	"	'	"	m	s	h m s
Apr.	1 Su	0	41	8.79	9.101	+	4	25 46.1	+57.91	16	1.87	8.80	−4 3.19	+0.755 0 37 5.60
	2 Mo	0	44	47.26	9.105		4	48 53.5	57.70	16	1.60	8.80	3 45.11	0.751 0 41 2.15
	3 Tu	0	48	25.83	9.110		5	11 55.7	57.48	16	1.32	8.80	3 27.13	0.747 0 44 58.70
	4 We	0	52	4.54	9.116		5	34 52.4	57.24	16	1.05	8.80	3 9.28	0.741 0 48 55.26
	5 Th	0	55	43.39	9.122		5	57 43.1	56.99	16	0.78	8.79	2 51.58	0.734 0 52 51.81
	6 Fr	0	59	22.41	9.130	+	6	20 27.7	+56.72	16	0.50	8.79	−2 34.05	+0.727 0 56 48.36
	7 Sa	1	3	1.63	9.138		6	43 5.7	56.44	16	0.23	8.79	2 16.71	0.718 1 0 44.92
	8 Su	1	6	41.05	9.147		7	5 36.9	56.15	15	59.96	8.79	1 59.58	0.709 1 4 41.47
	9 Mo	1	10	20.71	9.153		7	28 0.9	55.85	15	59.68	8.78	1 42.69	0.698 1 8 38.02
	10 Tu	1	14	0.63	9.169		7	50 17.4	55.53	15	59.40	8.78	1 26.06	0.688 1 12 34.58
	11 We	1	17	40.83	9.181	+	8	12 26.1	+55.20	15	59.13	8.78	−1 9.69	+0.676 1 16 31.13
	12 Th	1	21	21.32	9.193		8	34 26.7	54.85	15	58.85	8.78	0 53.63	0.663 1 20 27.69
	13 Fr	1	25	2.12	9.207		8	56 18.8	54.49	15	58.57	8.77	0 37.88	0.649 1 24 24.24
	14 Sa	1	28	43.26	9.222		9	18 2.1	54.12	15	58.30	8.77	0 22.47	0.635 1 28 20.79
	15 Su	1	32	24.76	9.237		9	39 36.3	53.73	15	58.02	8.77	−0 7.41	0.620 1 32 17.35
	16 Mo	1	36	6.62	9.252	+10	1	1.0	+53.33	15	57.75	8.77	+0 7.28	+0.604 1 36 13.90
	17 Tu	1	39	48.87	9.268		10	22 15.9	52.91	15	57.48	8.76	0 21.59	0.588 1 40 10.46
	18 We	1	43	31.51	9.285		10	43 20.6	52.48	15	57.21	8.76	0 35.50	0.571 1 44 7.01
	19 Th	1	47	14.55	9.302		11	4 14.7	52.03	15	56.95	8.76	0 49.01	0.554 1 48 3.56
	20 Fr	1	50	58.02	9.320		11	24 57.9	51.57	15	56.68	8.76	1 2.10	0.537 1 52 0.12
	21 Sa	1	54	41.91	9.338	+11	45	29.9	+51.09	15	56.43	8.75	+1 14.76	+0.519 1 55 56.67
	22 Su	1	58	26.23	9.356		12	5 50.3	50.60	15	56.17	8.75	1 26.99	0.500 1 59 53.23
	23 Mo	2	2	11.00	9.375		12	25 58.6	50.09	15	55.91	8.75	1 38.78	0.482 2 3 49.78
	24 Tu	2	5	56.22	9.394		12	45 54.7	49.57	15	55.66	8.75	1 50.12	0.463 2 7 46.34
	25 We	2	9	41.90	9.413		13	5 38.1	49.04	15	55.41	8.74	2 0.99	0.443 2 11 42.89
	26 Th	2	13	28.04	9.432	+13	25	8.5	+48.49	15	55.17	8.74	+2 11.40	+0.424 2 15 39.45
	27 Fr	2	17	14.66	9.453		13	44 25.6	47.93	15	54.93	8.74	2 21.33	0.404 2 19 36.00
	28 Sa	2	21	1.77	9.473		14	3 29.1	47.36	15	54.69	8.74	2 30.78	0.384 2 23 32.55
	29 Su	2	24	49.37	9.494		14	22 18.7	46.77	15	54.45	8.74	2 39.74	0.363 2 27 29.11
	30 Mo	2	28	37.47	9.515		14	40 53.9	46.17	15	54.21	8.73	2 48.19	0.342 2 31 25.66
May	1 Tu	2	32	26.09	9.536	+14	59	14.6	+45.56	15	53.98	8.73	+2 56.13	+0.320 2 35 22.22
	2 We	2	36	15.22	9.558		15	17 20.5	44.93	15	53.75	8.73	3 3.55	0.298 2 39 18.77
	3 Th	2	40	4.88	9.580		15	35 11.2	44.29	15	53.51	8.73	3 10.45	0.276 2 43 15.33
	4 Fr	2	43	55.08	9.603		15	52 46.3	43.64	15	53.29	8.73	3 16.81	0.254 2 47 11.88
	5 Sa	2	47	45.82	9.626		16	10 5.8	42.97	15	53.06	8.72	3 22.62	0.231 2 51 8.44
	6 Su	2	51	37.11	9.649	+16	27	9.1	+42.30	15	52.83	8.72	+3 27.89	+0.208 2 55 5.00
	7 Mo	2	55	28.96	9.672		16	43 56.1	41.61	15	52.61	8.72	3 32.59	0.184 2 59 1.55
	8 Tu	2	59	21.38	9.696		17	0 26.4	40.91	15	52.39	8.72	3 36.73	0.160 3 2 58.11
	9 We	3	3	14.38	9.720		17	16 39.8	40.20	15	52.16	8.72	3 40.29	0.136 3 6 54.66
	10 Th	3	7	7.95	9.744		17	32 36.0	39.48	15	51.94	8.71	3 43.26	0.112 3 10 51.22
	11 Fr	3	11	2.12	9.769	+17	48	14.7	+38.74	15	51.73	8.71	+3 45.65	+0.087 3 14 47.77
	12 Sa	3	14	56.88	9.794		18	8 35.6	37.99	15	51.51	8.71	3 47.45	0.063 3 18 44.33
	13 Su	3	18	52.23	9.819		18	18 38.3	37.23	15	51.30	8.71	3 48.65	0.038 3 22 40.89
	14 Mo	3	22	48.18	9.844		18	33 22.7	36.46	15	51.09	8.71	3 49.26	+0.013 3 26 37.44
	15 Tu	3	26	44.72	9.868		18	47 48.4	35.68	15	50.88	8.70	3 49.27	−0.012 3 30 34.00
	16 We	3	30	41.85	9.893	+19	1	55.2	+34.88	15	50.68	8.70	+3 48.70	−0.036 3 34 30.56
	17 Th	3	34	39.57	9.917	+19	15	42.6	+34.07	15	50.48	8.70	+3 47.54	−0.060 3 38 27.11

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 27'	h m s
Apr. 1	91	11 11 45.7	147.91	-0.06	9.999 8342	+51.0	12.46	+16.16	20.47	3.24	23 19 4.57
2	92	12 10 54.5	147.82	0.17	9.999 9568	51.1	12.60	16.13	20.47	3.23	23 15 8.66
3	93	13 10 1.0	147.73	0.27	0.000 0797	51.2	12.74	16.09	20.46	3.21	23 11 12.75
4	94	14 9 5.3	147.63	0.35	0.000 2028	51.3	12.88	16.06	20.45	3.19	23 7 16.85
5	95	15 8 7.4	147.54	0.41	0.000 3262	51.5	13.01	16.02	20.45	3.17	23 3 20.94
6	96	16 7 7.4	147.46	-0.45	0.000 4500	+51.7	13.15	+15.99	20.44	3.15	22 59 25.03
7	97	17 6 5.3	147.37	0.46	0.000 5741	51.8	13.29	15.96	20.44	3.13	22 55 29.13
8	98	18 5 1.2	147.29	0.44	0.000 6985	51.9	13.43	15.93	20.43	3.11	22 51 33.22
9	99	19 3 55.1	147.21	0.39	0.000 8232	52.0	13.56	15.90	20.43	3.09	22 47 37.31
10	100	20 2 47.1	147.13	0.32	0.000 9482	52.1	13.70	15.87	20.42	3.07	22 43 41.40
11	101	21 1 37.3	147.05	-0.22	0.001 0734	+52.2	13.84	+15.84	20.41	3.05	22 39 45.50
12	102	22 0 25.6	146.96	-0.10	0.001 1985	52.1	13.98	15.81	20.41	3.03	22 35 49.59
13	103	22 59 12.3	146.91	+0.03	0.001 3235	52.0	14.11	15.78	20.40	3.00	22 31 53.68
14	104	23 57 57.3	146.84	0.16	0.001 4483	51.9	14.25	15.76	20.40	2.98	22 27 57.77
15	105	24 56 40.6	146.77	0.29	0.001 5727	51.7	14.39	15.73	20.39	2.96	22 24 1.86
16	106	25 55 22.3	146.70	+0.41	0.001 6963	+51.4	14.53	+15.71	20.38	2.93	22 20 5.96
17	107	26 54 2.3	146.63	0.51	0.001 8192	51.0	14.66	15.69	20.38	2.91	22 16 10.05
18	108	27 52 40.6	146.56	0.59	0.001 9412	50.6	14.80	15.67	20.37	2.89	22 12 14.14
19	109	28 51 17.2	146.49	0.63	0.002 0620	50.1	14.94	15.65	20.37	2.86	22 8 18.23
20	110	29 49 52.1	146.41	0.64	0.002 1815	49.5	15.08	15.63	20.37	2.83	22 4 22.32
21	111	30 48 25.1	146.34	+0.63	0.002 2997	+49.0	15.21	+15.61	20.36	2.81	22 0 26.42
22	112	31 46 56.2	146.26	0.59	0.002 4166	48.4	15.35	15.59	20.36	2.79	21 56 30.51
23	113	32 45 25.3	146.17	0.52	0.002 5320	47.8	15.49	15.58	20.35	2.76	21 52 34.60
24	114	33 43 52.5	146.09	0.42	0.002 6461	47.3	15.63	15.56	20.35	2.73	21 48 38.69
25	115	34 42 17.6	146.01	0.30	0.002 7590	46.7	15.76	15.55	20.34	2.71	21 44 42.78
26	116	35 40 40.7	145.92	+0.18	0.002 8705	+46.2	15.90	+15.54	20.33	2.68	21 40 46.87
27	117	36 39 1.8	145.83	+0.05	0.002 9809	45.8	16.04	15.53	20.33	2.65	21 36 50.96
28	118	37 37 20.7	145.75	-0.07	0.003 0903	45.4	16.18	15.52	20.32	2.62	21 32 55.05
29	119	38 35 37.6	145.66	0.19	0.003 1986	44.9	16.32	15.52	20.32	2.60	21 28 59.14
30	120	39 33 52.5	145.58	0.30	0.003 3059	44.5	16.45	15.51	20.31	2.57	21 25 3.24
May 1	121	40 32 5.4	145.49	-0.38	0.003 4124	+44.2	16.59	+15.50	20.31	2.54	21 21 7.33
2	122	41 30 16.2	145.41	0.44	0.003 5180	43.8	16.73	15.50	20.30	2.51	21 17 11.42
3	123	42 28 25.2	145.33	0.48	0.003 6229	43.5	16.87	15.50	20.30	2.49	21 13 15.51
4	124	43 26 32.2	145.25	0.49	0.003 7270	43.3	17.00	15.50	20.29	2.46	21 9 19.60
5	125	44 24 37.4	145.18	0.47	0.003 8306	43.0	17.14	15.50	20.29	2.43	21 5 23.69
6	126	45 22 40.9	145.11	-0.43	0.003 9335	+42.7	17.28	+15.50	20.28	2.40	21 1 27.78
7	127	46 20 42.6	145.04	0.36	0.004 0358	42.5	17.42	15.51	20.28	2.38	20 57 31.87
8	128	47 18 42.8	144.98	0.25	0.004 1375	42.3	17.55	15.51	20.27	2.35	20 53 35.96
9	129	48 16 41.4	144.91	0.14	0.004 2386	42.0	17.69	15.52	20.27	2.32	20 49 40.05
10	130	49 14 38.6	144.86	-0.01	0.004 3390	41.7	17.83	15.53	20.26	2.29	20 45 44.14
11	131	50 12 34.5	144.80	+0.12	0.004 4385	+41.3	17.97	+15.54	20.26	2.26	20 41 48.23
12	132	51 10 29.0	144.75	0.26	0.004 5371	40.8	18.10	15.55	20.25	2.24	20 37 52.32
13	133	52 8 22.4	144.69	0.37	0.004 6345	40.3	18.24	15.56	20.25	2.21	20 33 56.41
14	134	53 6 14.5	144.65	0.48	0.004 7306	39.8	18.38	15.57	20.24	2.18	20 30 0.50
15	135	54 4 5.5	144.60	0.57	0.004 8253	39.1	18.52	15.59	20.24	2.16	20 26 4.59
16	136	55 1 55.3	144.55	+0.62	0.004 9183	+38.4	18.65	+15.60	20.23	2.13	20 22 8.68
17	137	55 59 43.9	144.50	+0.63	0.005 0096	+37.6	18.79	+15.62	20.23	2.10	20 18 12.77

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s	
May 17	Th	3	34	39.57	9.917	+19	15	42.6	+34.07	15	50.48	8.70	+3 47.54	-0.060	3	38	27.11
18	Fr	3	38	37.87	9.941	19	29	10.5	33.25	15	50.28	8.70	3 45.80	0.084	3	42	23.67
19	Sa	3	42	36.74	9.964	19	42	18.6	32.42	15	50.09	8.70	3 43.49	0.108	3	46	20.22
20	Su	3	46	36.16	9.987	19	55	6.5	31.57	15	49.90	8.69	3 40.62	0.131	3	50	16.78
21	Mo	3	50	36.13	10.010	20	7	34.1	30.72	15	49.72	8.69	3 37.20	0.154	3	54	13.34
22	Tu	3	54	36.65	10.033	+20	19	41.0	+29.86	15	49.55	8.69	+3 33.25	-0.176	3	58	9.90
23	We	3	58	37.69	10.054	20	31	27.1	28.98	15	49.37	8.69	3 28.77	0.197	4	2	6.45
24	Th	4	2	39.23	10.075	20	42	52.0	28.09	15	49.21	8.69	3 23.78	0.218	4	6	3.01
25	Fr	4	6	41.28	10.096	20	53	55.5	27.20	15	49.04	8.69	3 18.29	0.239	4	9	59.57
26	Sa	4	10	43.81	10.115	21	4	37.4	26.29	15	48.88	8.69	3 12.32	0.259	4	13	56.12
27	Su	4	14	46.81	10.135	+21	14	57.5	+25.38	15	48.73	8.68	+3 5.87	-0.278	4	17	52.68
28	Mo	4	18	50.28	10.154	21	24	55.6	24.46	15	48.58	8.68	2 58.96	0.297	4	21	49.24
29	Tu	4	22	54.19	10.172	21	34	31.4	23.53	15	48.43	8.68	2 51.60	0.316	4	25	45.79
30	We	4	26	58.54	10.190	21	43	44.8	22.59	15	48.29	8.68	2 43.81	0.333	4	29	42.35
31	Th	4	31	3.30	10.207	21	52	35.6	21.64	15	48.15	8.68	2 35.61	0.350	4	33	38.91
June 1	Fr	4	35	8.47	10.223	+22	1	3.6	+20.69	15	48.01	8.68	+2 27.00	-0.367	4	37	35.47
2	Sa	4	39	14.02	10.239	22	9	8.6	19.73	15	47.88	8.68	2 18.00	0.383	4	41	32.02
3	Su	4	43	19.96	10.255	22	16	50.5	18.76	15	47.75	8.67	2 8.63	0.398	4	45	28.58
4	Mo	4	47	26.25	10.269	22	24	9.1	17.79	15	47.62	8.67	1 58.89	0.413	4	49	25.14
5	Tu	4	51	32.89	10.284	22	31	4.2	16.81	15	47.50	8.67	1 48.80	0.427	4	53	21.70
6	We	4	55	39.87	10.298	+22	37	35.8	+15.82	15	47.38	8.67	+1 38.38	-0.441	4	57	18.25
7	Th	4	59	47.18	10.311	22	43	43.6	14.83	15	47.26	8.67	1 27.64	0.454	5	1	14.81
8	Fr	5	3	54.79	10.323	22	49	27.5	13.83	15	47.14	8.67	1 16.59	0.467	5	5	11.37
9	Sa	5	8	2.69	10.335	22	54	47.4	12.83	15	47.03	8.67	1 5.24	0.479	5	9	7.93
10	Su	5	12	10.86	10.346	22	59	43.2	11.82	15	46.92	8.67	0 53.62	0.490	5	13	4.49
11	Mo	5	16	19.29	10.357	+23	4	14.7	+10.81	15	46.81	8.67	+0 41.75	-0.500	5	17	1.04
12	Tu	5	20	27.97	10.366	23	8	21.9	9.79	15	46.70	8.67	0 29.64	0.509	5	20	57.60
13	We	5	24	36.85	10.374	23	12	4.7	8.77	15	46.61	8.66	0 17.31	0.518	5	24	54.16
14	Th	5	28	45.93	10.382	23	15	22.8	7.74	15	46.51	8.66	+0 4.79	0.525	5	28	50.72
15	Fr	5	32	55.17	10.388	23	18	16.4	6.72	15	46.42	8.66	-0 7.89	0.532	5	32	47.28
16	Sa	5	37	4.55	10.393	+23	20	45.3	+5.69	15	46.34	8.66	-0 20.72	-0.537	5	36	43.83
17	Su	5	41	14.05	10.398	23	22	49.5	4.66	15	46.26	8.66	0 33.66	0.541	5	40	40.39
18	Mo	5	45	23.64	10.401	23	24	28.9	3.62	15	46.19	8.66	0 46.69	0.544	5	44	36.95
19	Tu	5	49	33.28	10.403	23	25	43.4	2.59	15	46.12	8.66	0 59.78	0.546	5	48	33.51
20	We	5	53	42.96	10.404	23	26	33.2	1.56	15	46.06	8.66	1 12.89	0.547	5	52	30.07
21	Th	5	57	52.64	10.403	+23	26	58.1	+0.52	15	46.00	8.66	-1 26.01	-0.546	5	56	26.62
22	Fr	6	2	2.29	10.401	23	26	58.3	-0.51	15	45.95	8.66	1 39.11	0.545	6	0	23.18
23	Sa	6	6	11.90	10.399	23	26	33.6	1.55	15	45.91	8.66	1 52.16	0.542	6	4	19.74
24	Su	6	10	21.42	10.395	23	25	44.1	2.58	15	45.87	8.66	2 5.13	0.538	6	8	16.30
25	Mo	6	14	30.85	10.390	23	24	29.9	3.61	15	45.83	8.66	2 17.99	0.533	6	12	12.86
26	Tu	6	18	40.15	10.384	+23	22	51.9	-4.63	15	45.80	8.66	-2 30.73	-0.528	6	16	9.41
27	We	6	22	49.29	10.377	23	20	47.5	5.66	15	45.77	8.66	2 43.32	0.521	6	20	5.97
28	Th	6	26	58.26	10.370	23	18	19.4	6.68	15	45.75	8.66	2 55.73	0.513	6	24	2.53
29	Fr	6	31	7.03	10.361	23	15	26.8	7.70	15	45.73	8.66	3 7.94	0.505	6	27	59.09
30	Sa	6	35	15.58	10.351	23	12	9.8	8.72	15	45.72	8.66	3 19.93	0.496	6	31	55.64
July 1	Su	6	39	23.88	10.341	+23	8	28.4	-9.73	15	45.71	8.66	-3 31.68	-0.484	6	35	52.20
2	Mo	6	43	31.93	10.330	+23	4	22.9	-10.73	15	45.71	8.66	-3 43.17	-0.473	6	39	48.76

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FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.					
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s			
July	1	Su	6	39	23.88	10.341	+23	8	28.4	-9.73	15	45.71	8.66	-3	31.68	-0.484	6	35	52.20
	2	Mo	6	43	31.93	10.330	23	4	22.9	10.73	15	45.71	8.66	3	43.17	0.473	6	39	48.76
	3	Tu	6	47	39.69	10.317	22	59	53.2	11.74	15	45.70	8.66	3	54.37	0.461	6	43	45.32
	4	We	6	51	47.16	10.305	22	54	59.4	12.74	15	45.70	8.66	4	5.28	0.448	6	47	41.88
	5	Th	6	55	54.32	10.292	22	49	41.7	13.73	15	45.71	8.66	4	15.88	0.435	6	51	38.43
	6	Fr	7	0	1.15	10.278	+22	44	0.2	-14.72	15	45.71	8.66	-4	26.16	-0.421	6	55	34.99
	7	Sa	7	4	7.64	10.263	22	37	55.1	15.71	15	45.72	8.66	4	36.09	0.407	6	59	31.55
	8	Su	7	8	13.78	10.248	22	31	26.3	16.69	15	45.74	8.66	4	45.67	0.392	7	3	28.11
	9	Mo	7	12	19.55	10.233	22	24	34.2	17.66	15	45.75	8.66	4	54.89	0.376	7	7	24.66
	10	Tu	7	16	24.94	10.216	22	17	18.8	18.63	15	45.77	8.66	5	3.72	0.360	7	11	21.22
	11	We	7	20	29.92	10.199	+22	9	40.2	-19.59	15	45.80	8.66	-5	12.15	-0.343	7	15	17.78
	12	Th	7	24	34.49	10.182	22	1	38.7	20.54	15	45.83	8.66	5	20.16	0.325	7	19	14.34
	13	Fr	7	28	38.63	10.163	21	53	14.5	21.48	15	45.86	8.66	5	27.74	0.306	7	23	10.89
	14	Sa	7	32	42.32	10.144	21	44	27.7	22.42	15	45.90	8.66	5	34.87	0.287	7	27	7.45
	15	Su	7	36	45.54	10.124	21	35	18.6	23.34	15	45.94	8.66	5	41.53	0.268	7	31	4.01
	16	Mo	7	40	48.28	10.104	+21	25	47.3	-24.26	15	45.99	8.66	-5	47.71	-0.247	7	35	0.57
	17	Tu	7	44	50.52	10.083	21	15	54.1	25.17	15	46.04	8.66	5	53.39	0.226	7	38	57.12
	18	We	7	48	52.24	10.061	21	5	39.2	26.07	15	46.11	8.66	5	58.56	0.204	7	42	53.68
	19	Th	7	52	53.43	10.038	20	55	2.9	26.96	15	46.17	8.66	6	3.19	0.182	7	46	50.24
	20	Fr	7	56	54.07	10.015	20	44	5.4	27.83	15	46.24	8.66	6	7.28	0.159	7	50	46.79
	21	Sa	8	0	54.16	9.992	+20	32	47.0	-28.70	15	46.32	8.66	-6	10.81	-0.136	7	54	43.35
	22	Su	8	4	53.68	9.968	20	21	7.8	29.56	15	46.40	8.66	6	13.78	0.112	7	58	39.91
	23	Mo	8	8	52.62	9.944	20	9	8.3	30.40	15	46.49	8.66	6	16.16	0.087	8	2	36.46
	24	Tu	8	12	50.97	9.919	19	56	48.5	31.24	15	46.58	8.66	6	17.95	0.062	8	6	33.02
	25	We	8	16	48.73	9.894	19	44	8.9	32.06	15	46.68	8.66	6	19.15	0.037	8	10	29.58
	26	Th	8	20	45.88	9.868	+19	31	9.7	-32.87	15	46.78	8.66	-6	19.74	-0.012	8	14	26.13
	27	Fr	8	24	42.41	9.843	19	17	51.2	33.67	15	46.88	8.67	6	19.72	+0.014	8	18	22.69
	28	Sa	8	28	38.33	9.817	19	4	13.5	34.46	15	46.99	8.67	6	19.08	0.039	8	22	19.25
	29	Su	8	32	33.63	9.791	18	50	17.1	35.24	15	47.11	8.67	6	17.83	0.065	8	26	15.80
	30	Mo	8	36	28.31	9.765	18	36	2.2	36.00	15	47.22	8.67	6	15.95	0.091	8	30	12.36
	31	Tu	8	40	22.37	9.740	+18	21	29.0	-36.76	15	47.34	8.67	-6	13.45	+0.117	8	34	8.92
Aug.	1	We	8	44	15.81	9.714	18	6	37.8	37.50	15	47.47	8.67	6	10.34	0.143	8	38	5.47
	2	Th	8	48	8.64	9.689	17	51	28.9	38.24	15	47.59	8.67	6	6.61	0.168	8	42	2.03
	3	Fr	8	52	0.86	9.663	17	36	2.5	38.96	15	47.72	8.67	6	2.27	0.193	8	45	58.58
	4	Sa	8	55	52.47	9.638	17	20	19.0	39.67	15	47.85	8.68	5	57.33	0.218	8	49	55.14
	5	Su	8	59	43.49	9.614	+17	4	18.5	-40.37	15	47.99	8.68	-5	51.80	+0.243	8	53	51.70
	6	Mo	9	3	33.93	9.589	16	48	1.4	41.06	15	48.12	8.68	5	45.68	0.267	8	57	48.25
	7	Tu	9	7	23.78	9.565	16	31	27.9	41.73	15	48.26	8.68	5	38.98	0.291	9	1	44.81
	8	We	9	11	13.06	9.542	16	14	38.3	42.40	15	48.41	8.68	5	31.70	0.315	9	5	41.36
	9	Th	9	15	1.78	9.518	15	57	32.9	43.05	15	48.55	8.68	5	23.86	0.338	9	9	37.92
	10	Fr	9	18	49.93	9.495	+15	40	12.0	-43.69	15	48.70	8.68	-5	15.46	+0.362	9	13	34.47
	11	Sa	9	22	37.53	9.472	15	22	35.9	44.32	15	48.85	8.68	5	6.50	0.385	9	17	31.03
	12	Su	9	26	24.58	9.449	15	4	44.9	44.93	15	49.01	8.68	4	56.99	0.408	9	21	27.58
	13	Mo	9	30	11.08	9.426	14	46	39.4	45.53	15	49.17	8.69	4	46.94	0.430	9	25	24.14
	14	Tu	9	33	57.04	9.404	14	28	19.7	46.11	15	49.34	8.69	4	36.35	0.453	9	29	20.69
	15	We	9	37	42.47	9.382	+14	9	46.1	-46.68	15	49.51	8.69	-4	25.22	+0.475	9	33	17.25
	16	Th	9	41	27.37	9.360	+13	50	58.9	-47.24	15	49.68	8.69	-4	13.57	+0.496	9	37	13.80

FOR GREENWICH MEAN NOON

Date.		Day of Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliq-uity.	Mean Time of Sidereal Noon.
			" " "	"	"			"	"	"	23° 27'	h m s
July	1	182	99 3 20.3	142.96	-0.39	0.007 1930	+ 1.4	24.98	+17.24	20.13	1.35	17 21 16.74
	2	183	100 0 31.3	142.96	0.28	0.007 1956	0.8	25.12	17.28	20.13	1.35	17 17 20.83
	3	184	100 57 42.0	142.96	0.15	0.007 1968	+ 0.2	25.26	17.32	20.13	1.35	17 13 24.92
	4	185	101 54 52.6	142.94	-0.02	0.007 1965	- 0.4	25.40	17.36	20.13	1.34	17 9 29.01
	5	186	102 52 3.2	142.94	+0.12	0.007 1949	1.0	25.53	17.40	20.13	1.34	17 5 33.09
	6	187	103 49 13.9	142.96	+0.26	0.007 1919	- 1.6	25.67	+17.43	20.13	1.34	17 1 37.18
	7	188	104 46 24.8	142.96	0.38	0.007 1874	2.2	25.81	17.47	20.13	1.34	16 57 41.27
	8	189	105 43 36.0	142.97	0.48	0.007 1814	2.8	25.95	17.51	20.13	1.34	16 53 45.36
	9	190	106 40 47.6	142.99	0.55	0.007 1739	3.5	26.09	17.54	20.13	1.34	16 49 49.45
	10	191	107 37 59.6	143.01	0.59	0.007 1646	4.3	26.22	17.58	20.13	1.34	16 45 53.54
	11	192	108 35 12.2	143.03	+0.60	0.007 1534	- 5.1	26.36	+17.62	20.13	1.34	16 41 57.63
	12	193	109 32 25.3	143.06	0.57	0.007 1402	5.9	26.50	17.65	20.13	1.34	16 38 1.71
	13	194	110 29 38.9	143.08	0.52	0.007 1248	6.9	26.64	17.68	20.13	1.34	16 34 5.80
	14	195	111 26 53.1	143.10	0.43	0.007 1071	7.9	26.77	17.71	20.13	1.34	16 30 9.89
	15	196	112 24 7.9	143.13	0.33	0.007 0871	8.9	26.91	17.75	20.13	1.34	16 26 13.98
	16	197	113 21 23.2	143.15	+0.20	0.007 0646	- 9.9	27.05	+17.78	20.13	1.35	16 22 18.07
	17	198	114 18 39.1	143.17	+0.06	0.007 0396	10.9	27.19	17.80	20.14	1.35	16 18 22.16
	18	199	115 15 55.4	143.19	-0.07	0.007 0121	12.0	27.32	17.83	20.14	1.36	16 14 26.25
	19	200	116 13 12.3	143.21	0.20	0.006 9820	13.0	27.46	17.86	20.14	1.36	16 10 30.34
	20	201	117 10 29.6	143.23	0.32	0.006 9495	14.1	27.60	17.89	20.14	1.37	16 6 34.42
	21	202	118 7 47.4	143.25	-0.42	0.006 9144	-15.1	27.74	+17.91	20.14	1.37	16 2 38.51
	22	203	119 5 5.6	143.27	0.50	0.006 8769	16.1	27.87	17.94	20.14	1.37	15 58 42.60
	23	204	120 2 24.2	143.29	0.56	0.006 8370	17.1	28.01	17.96	20.14	1.38	15 54 46.69
	24	205	120 59 43.3	143.30	0.61	0.006 7948	18.0	28.15	17.98	20.15	1.39	15 50 50.78
	25	206	121 57 2.8	143.32	0.62	0.006 7504	18.9	28.29	18.00	20.15	1.39	15 46 54.87
	26	207	122 54 22.7	143.34	-0.61	0.006 7039	-19.8	28.42	+18.02	20.15	1.40	15 42 58.96
	27	208	123 51 43.1	143.36	0.55	0.006 6554	20.6	28.56	18.04	20.15	1.41	15 39 3.05
	28	209	124 49 3.9	143.38	0.48	0.006 6049	21.4	28.70	18.05	20.16	1.41	15 35 7.14
	29	210	125 46 25.3	143.40	0.37	0.006 5527	22.1	28.84	18.07	20.16	1.42	15 31 11.23
	30	211	126 43 47.1	143.42	0.25	0.006 4989	22.7	28.98	18.08	20.16	1.43	15 27 15.32
	31	212	127 41 9.6	143.45	-0.13	0.006 4436	-23.3	29.11	+18.10	20.16	1.44	15 23 19.41
Aug.	1	213	128 38 32.7	143.48	+0.01	0.006 3870	23.8	29.25	18.11	20.17	1.44	15 19 23.50
	2	214	129 35 56.5	143.51	0.15	0.006 3292	24.3	29.39	18.12	20.17	1.45	15 15 27.59
	3	215	130 33 21.3	143.55	0.26	0.006 2702	24.8	29.53	18.12	20.17	1.46	15 11 31.68
	4	216	131 30 47.0	143.59	0.36	0.006 2101	25.3	29.66	18.13	20.17	1.47	15 7 35.77
	5	217	132 28 13.7	143.64	+0.44	0.006 1488	-25.8	29.80	+18.14	20.18	1.48	15 3 39.86
	6	218	133 25 41.7	143.69	0.49	0.006 0864	26.3	29.94	18.14	20.18	1.48	14 59 43.95
	7	219	134 23 10.9	143.75	0.51	0.006 0227	26.9	30.08	18.15	20.18	1.49	14 55 48.04
	8	220	135 20 41.5	143.80	0.49	0.005 9575	27.5	30.21	18.15	20.19	1.50	14 51 52.13
	9	221	136 18 13.4	143.86	0.44	0.005 8908	28.1	30.35	18.15	20.19	1.51	14 47 56.22
	10	222	137 15 46.8	143.92	+0.36	0.005 8224	-28.8	30.49	+18.15	20.19	1.52	14 44 0.31
	11	223	138 13 21.6	143.98	0.26	0.005 7523	29.6	30.63	18.15	20.20	1.53	14 40 4.40
	12	224	139 10 57.8	144.04	0.14	0.005 6802	30.4	30.76	18.14	20.20	1.53	14 36 8.49
	13	225	140 8 35.5	144.10	+0.01	0.005 6062	31.2	30.90	18.14	20.20	1.54	14 32 12.58
	14	226	141 6 14.6	144.16	-0.11	0.005 5302	32.1	31.04	18.13	20.21	1.55	14 28 16.67
	15	227	142 3 55.1	144.21	-0.23	0.005 4522	-33.0	31.18	+18.12	20.21	1.56	14 24 20.76
	16	228	143 1 37.0	144.27	-0.35	0.005 3720	-33.9	31.31	+18.11	20.21	1.57	14 20 24.85



FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Aug. 16	Th	9 41 27.37	9.360	+13 50 58.9	-47.24	15 49.68	8.69	- 4 13.57	+0.496	9 37 13.80
17	Fr	9 45 11.76	9.339	13 31 58.5	47.79	15 49.86	8.69	4 1.40	0.518	9 41 10.36
18	Sa	9 48 55.63	9.317	13 12 45.2	48.32	15 50.05	8.70	3 48.72	0.539	9 45 6.91
19	Su	9 52 38.99	9.296	12 53 19.4	48.83	15 50.24	8.70	3 35.53	0.560	9 49 3.47
20	Mo	9 56 21.86	9.276	12 33 41.3	49.34	15 50.43	8.70	3 21.84	0.580	9 53 0.02
21	Tu	10 0 4.24	9.256	+12 13 51.3	-49.83	15 50.63	8.70	- 3 7.67	+0.600	9 56 56.58
22	We	10 3 46.15	9.236	11 53 49.8	50.30	15 50.83	8.70	2 53.02	0.620	10 0 53.13
23	Th	10 7 27.59	9.217	11 33 37.0	50.76	15 51.04	8.70	2 37.90	0.639	10 4 49.68
24	Fr	10 11 8.57	9.198	11 13 13.4	51.20	15 51.24	8.70	2 22.33	0.658	10 8 46.24
25	Sa	10 14 49.11	9.180	10 52 39.3	51.64	15 51.46	8.71	2 6.32	0.676	10 12 42.79
26	Su	10 18 29.22	9.162	+10 31 54.8	-52.06	15 51.67	8.71	- 1 49.87	+0.694	10 16 39.35
27	Mo	10 22 8.91	9.145	10 11 0.5	52.47	15 51.89	8.71	1 33.01	0.711	10 20 35.90
28	Tu	10 25 48.20	9.129	9 49 56.5	52.86	15 52.11	8.71	1 15.75	0.727	10 24 32.45
29	We	10 29 27.11	9.114	9 28 43.3	53.24	15 52.34	8.72	0 58.11	0.743	10 28 29.01
30	Th	10 33 5.66	9.099	9 7 21.1	53.61	15 52.56	8.72	0 40.10	0.758	10 32 25.56
31	Fr	10 36 43.86	9.085	+ 8 45 50.2	-53.97	15 52.79	8.72	- 0 21.74	+0.772	10 36 22.12
Sept. 1	Sa	10 40 21.73	9.072	8 24 10.8	54.31	15 53.01	8.72	- 0 3.06	0.785	10 40 18.67
2	Su	10 43 59.30	9.059	8 2 23.3	54.64	15 53.24	8.73	+ 0 15.92	0.797	10 44 15.22
3	Mo	10 47 36.59	9.048	7 40 28.0	54.96	15 53.47	8.73	0 35.19	0.808	10 48 11.78
4	Tu	10 51 13.62	9.038	7 18 25.2	55.27	15 53.70	8.73	0 54.71	0.818	10 52 8.33
5	We	10 54 50.41	9.028	+ 6 56 15.1	-55.57	15 53.94	8.73	+ 1 14.47	+0.828	10 56 4.88
6	Th	10 58 26.98	9.020	6 33 58.1	55.85	15 54.17	8.73	1 34.45	0.837	11 0 1.44
7	Fr	11 2 3.36	9.012	6 11 34.4	56.12	15 54.41	8.74	1 54.63	0.845	11 3 57.99
8	Sa	11 5 39.56	9.005	5 49 4.5	56.37	15 54.64	8.74	2 14.98	0.852	11 7 54.54
9	Su	11 9 15.60	8.998	5 26 28.7	56.61	15 54.88	8.74	2 35.50	0.858	11 11 51.09
10	Mo	11 12 51.49	8.993	+ 5 3 47.2	-56.84	15 55.13	8.74	+ 2 56.16	+0.863	11 15 47.65
11	Tu	11 16 27.26	8.988	4 41 0.4	57.05	15 55.37	8.74	3 16.94	0.868	11 19 44.20
12	We	11 20 2.92	8.984	4 18 8.7	57.25	15 55.62	8.75	3 37.83	0.873	11 23 40.75
13	Th	11 23 38.49	8.981	3 55 12.5	57.43	15 55.87	8.75	3 58.82	0.876	11 27 37.31
14	Fr	11 27 13.99	8.978	3 32 12.0	57.60	15 56.12	8.75	4 19.87	0.879	11 31 33.86
15	Sa	11 30 49.43	8.976	+ 3 9 7.7	-57.76	15 56.38	8.75	+ 4 40.99	+0.881	11 35 30.41
16	Su	11 34 24.83	8.974	2 45 59.8	57.90	15 56.63	8.76	5 2.14	0.882	11 39 26.97
17	Mo	11 38 0.20	8.974	2 22 48.7	58.02	15 56.90	8.76	5 23.32	0.883	11 43 23.52
18	Tu	11 41 35.57	8.974	1 59 34.8	58.13	15 57.16	8.76	5 44.50	0.882	11 47 20.07
19	We	11 45 10.96	8.975	1 36 18.5	58.23	15 57.43	8.76	6 5.67	0.881	11 51 16.62
20	Th	11 48 46.37	8.976	+ 1 13 0.0	-58.31	15 57.70	8.77	+ 6 26.80	+0.880	11 55 13.18
21	Fr	11 52 21.83	8.979	0 49 39.8	58.37	15 57.97	8.77	6 47.90	0.878	11 59 9.73
22	Sa	11 55 57.35	8.982	0 26 18.3	58.42	15 58.24	8.77	7 8.93	0.875	12 3 6.28
23	Su	11 59 32.96	8.986	+ 0 2 55.6	58.46	15 58.52	8.77	7 29.88	0.871	12 7 2.84
24	Mo	12 3 8.67	8.990	- 0 20 27.8	58.48	15 58.80	8.78	7 50.72	0.866	12 10 59.39
25	Tu	12 6 44.50	8.996	- 0 43 51.5	-58.49	15 59.07	8.78	+ 8 11.45	+0.861	12 14 55.94
26	We	12 10 20.47	9.002	1 7 15.3	58.49	15 59.35	8.78	8 32.03	0.854	12 18 52.50
27	Th	12 13 56.60	9.009	1 30 38.7	58.47	15 59.63	8.78	8 52.45	0.847	12 22 49.05
28	Fr	12 17 32.91	9.017	1 54 1.6	58.44	15 59.91	8.79	9 12.69	0.839	12 26 45.60
29	Sa	12 21 9.44	9.027	2 17 23.5	58.39	16 0.18	8.79	9 32.71	0.830	12 30 42.15
30	Su	12 24 46.20	9.037	- 2 40 44.1	-58.33	16 0.46	8.79	+ 9 52.50	+0.820	12 34 38.71
Oct. 1	Mo	12 28 23.22	9.048	- 3 4 3.2	-58.26	16 0.74	8.79	+10 12.04	+0.808	12 38 35.23

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ' "	"	"			"	"	"	23° 27' "	h m s
Aug. 16	228	143 1 37.0	144.27	-0.35	0.005 3720	-33.9	31.31	+18.11	20.21	1.57	14 20 24.85
17	229	143 59 20.2	144.33	0.46	0.005 2897	34.7	31.45	18.10	20.22	1.58	14 16 28.94
18	230	144 57 4.8	144.39	0.55	0.005 2054	35.6	31.59	18.09	20.22	1.58	14 12 33.03
19	231	145 54 50.7	144.44	0.62	0.005 1190	36.4	31.73	18.08	20.22	1.59	14 8 37.13
20	232	146 52 37.9	144.49	0.66	0.005 0307	37.2	31.86	18.06	20.23	1.60	14 4 41.22
21	233	147 50 26.4	144.55	-0.67	0.004 9404	-38.0	32.00	+18.05	20.23	1.61	14 0 45.31
22	234	148 48 16.1	144.60	0.66	0.004 8482	38.8	32.14	18.03	20.24	1.61	13 56 49.40
23	235	149 46 7.1	144.65	0.62	0.004 7543	39.5	32.28	18.01	20.24	1.62	13 52 53.49
24	236	150 43 59.3	144.70	0.56	0.004 6586	40.2	32.42	17.99	20.25	1.63	13 48 57.58
25	237	151 41 52.7	144.75	0.46	0.004 5615	40.8	32.55	17.97	20.25	1.63	13 45 1.68
26	238	152 39 47.4	144.80	-0.35	0.004 4629	-41.3	32.69	+17.95	20.26	1.64	13 41 5.77
27	239	153 37 43.3	144.86	0.22	0.004 3631	41.8	32.83	17.92	20.26	1.64	13 37 9.86
28	240	154 35 40.5	144.91	-0.10	0.004 2622	42.2	32.97	17.90	20.26	1.65	13 33 13.95
29	241	155 33 39.0	144.97	+0.04	0.004 1604	42.6	33.10	17.87	20.27	1.65	13 29 18.04
30	242	156 31 38.9	145.03	0.16	0.004 0579	42.9	33.24	17.85	20.27	1.66	13 25 22.14
31	243	157 29 40.3	145.09	+0.27	0.003 9547	-43.1	33.38	+17.82	20.28	1.66	13 21 26.23
Sept. 1	244	158 27 43.2	145.16	0.35	0.003 8509	43.3	33.52	17.79	20.28	1.66	13 17 30.32
2	245	159 25 47.8	145.23	0.40	0.003 7467	43.5	33.65	17.76	20.29	1.67	13 13 34.41
3	246	160 23 54.2	145.30	0.42	0.003 6421	43.7	33.79	17.73	20.29	1.67	13 9 38.51
4	247	161 22 2.5	145.38	0.42	0.003 5369	44.0	33.93	17.70	20.30	1.67	13 5 42.60
5	248	162 20 12.6	145.47	+0.37	0.003 4311	-44.2	34.07	+17.66	20.30	1.67	13 1 46.69
6	249	163 18 24.8	145.55	0.30	0.003 3247	44.5	34.20	17.63	20.31	1.67	12 57 50.78
7	250	164 16 39.0	145.63	0.20	0.003 2175	44.9	34.34	17.60	20.31	1.67	12 53 54.88
8	251	165 14 55.3	145.72	+0.09	0.003 1093	45.3	34.48	17.56	20.32	1.67	12 49 58.97
9	252	166 13 13.6	145.81	-0.03	0.003 0002	45.7	34.62	17.52	20.32	1.67	12 46 3.06
10	253	167 11 34.1	145.89	-0.16	0.002 8900	-46.1	34.75	+17.49	20.33	1.67	12 42 7.16
11	254	168 9 56.6	145.98	0.28	0.002 7787	46.6	34.89	17.45	20.33	1.67	12 38 11.25
12	255	169 8 21.1	146.07	0.41	0.002 6662	47.1	35.03	17.41	20.34	1.67	12 34 15.34
13	256	170 6 47.7	146.15	0.51	0.002 5524	47.7	35.17	17.37	20.34	1.67	12 30 19.44
14	257	171 5 16.3	146.23	0.60	0.002 4374	48.2	35.30	17.33	20.35	1.66	12 26 23.53
15	258	172 3 46.9	146.31	-0.66	0.002 3211	-48.7	35.44	+17.30	20.36	1.66	12 22 27.62
16	259	173 2 19.4	146.39	0.70	0.002 2035	49.3	35.58	17.26	20.36	1.65	12 18 31.71
17	260	174 0 53.8	146.47	0.73	0.002 0847	49.8	35.72	17.22	20.37	1.65	12 14 35.81
18	261	174 59 30.1	146.55	0.73	0.001 9647	50.3	35.86	17.17	20.37	1.64	12 10 39.90
19	262	175 58 8.3	146.63	0.70	0.001 8435	50.7	35.99	17.13	20.38	1.63	12 6 43.99
20	263	176 56 48.2	146.70	-0.63	0.001 7213	-51.1	36.13	+17.09	20.38	1.63	12 2 48.09
21	264	177 55 29.9	146.77	0.54	0.001 5982	51.5	36.27	17.05	20.39	1.62	11 58 52.18
22	265	178 54 13.3	146.84	0.44	0.001 4741	51.8	36.41	17.01	20.39	1.61	11 54 56.27
23	266	179 52 58.4	146.91	0.32	0.001 3494	52.1	36.54	16.97	20.40	1.60	11 51 0.37
24	267	180 51 45.3	146.99	0.18	0.001 2241	52.3	36.68	16.93	20.41	1.59	11 47 4.46
25	268	181 50 33.8	147.06	-0.05	0.001 0984	-52.4	36.82	+16.88	20.41	1.58	11 43 8.55
26	269	182 49 24.0	147.13	+0.07	0.000 9724	52.5	36.96	16.84	20.42	1.57	11 39 12.64
27	270	183 48 16.0	147.20	0.18	0.000 8465	52.5	37.09	16.80	20.42	1.56	11 35 16.74
28	271	184 47 9.7	147.28	0.26	0.000 7206	52.4	37.23	16.76	20.43	1.55	11 31 20.83
29	272	185 46 5.2	147.35	0.31	0.000 5951	52.2	37.37	16.72	20.44	1.54	11 27 24.92
30	273	186 45 2.7	147.44	+0.34	0.000 4700	-52.1	37.51	+16.68	20.44	1.52	11 23 29.02
Oct. 1	274	187 44 2.2	147.52	+0.33	0.000 3453	-51.9	37.64	+16.64	20.45	1.51	11 19 33.11

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Oct. 1	Mo	12 28 23.22	9.048	— 3 4 3.2	—58.26	16 0.74	8.79	+10 12.04	+0.808	12 38 35.26
2	Tu	12 32 0.53	9.061	3 27 20.4	58.17	16 1.01	8.80	10 31.28	0.796	12 42 31.81
3	We	12 35 38.14	9.074	3 50 35.3	58.07	16 1.29	8.80	10 50.22	0.782	12 46 28.36
4	Th	12 39 16.09	9.089	4 13 47.7	57.96	16 1.56	8.80	11 8.82	0.768	12 50 24.92
5	Fr	12 42 54.40	9.104	4 36 57.2	57.83	16 1.83	8.80	11 27.07	0.753	12 54 21.47
6	Sa	12 46 33.09	9.120	— 5 0 3.5	—57.69	16 2.10	8.81	+11 44.94	+0.736	12 58 18.02
7	Su	12 50 12.17	9.137	5 23 6.1	57.53	16 2.37	8.81	12 2.40	0.719	13 2 14.58
8	Mo	12 53 51.68	9.155	5 46 4.7	57.35	16 2.64	8.81	12 19.45	0.701	13 6 11.13
9	Tu	12 57 31.63	9.174	6 8 58.9	57.16	16 2.92	8.81	12 36.06	0.682	13 10 7.68
10	We	13 1 12.03	9.193	6 31 48.3	56.96	16 3.19	8.82	12 52.20	0.663	13 14 4.24
11	Th	13 4 52.91	9.214	— 6 54 32.7	—56.74	16 3.46	8.82	+13 7.87	+0.643	13 18 0.79
12	Fr	13 8 34.29	9.235	7 17 11.5	56.49	16 3.73	8.82	13 23.05	0.622	13 21 57.34
13	Sa	13 12 16.18	9.256	7 39 44.3	56.24	16 4.00	8.82	13 37.72	0.600	13 25 53.90
14	Su	13 15 58.59	9.278	8 2 10.9	55.97	16 4.28	8.83	13 51.86	0.578	13 29 50.45
15	Mo	13 19 41.54	9.301	8 24 30.7	55.68	16 4.55	8.83	14 5.46	0.555	13 33 47.00
16	Tu	13 23 25.06	9.325	— 8 46 43.5	—55.38	16 4.82	8.83	+14 18.50	+0.531	13 37 43.56
17	We	13 27 9.15	9.349	9 8 48.7	55.06	16 5.10	8.83	14 30.96	0.507	13 41 40.11
18	Th	13 30 53.82	9.374	9 30 46.0	54.72	16 5.37	8.84	14 42.85	0.483	13 45 36.66
19	Fr	13 34 39.09	9.399	9 52 34.9	54.36	16 5.65	8.84	14 54.13	0.457	13 49 33.22
20	Sa	13 38 24.97	9.425	10 14 15.1	53.99	16 5.92	8.84	15 4.80	0.432	13 53 29.77
21	Su	13 42 11.48	9.451	—10 35 46.3	—53.60	16 6.20	8.84	+15 14.84	+0.405	13 57 26.32
22	Mo	13 45 58.63	9.478	10 57 7.9	53.19	16 6.47	8.85	15 24.25	0.379	14 1 22.88
23	Tu	13 49 46.43	9.505	11 18 19.5	52.77	16 6.75	8.85	15 33.01	0.351	14 5 19.43
24	We	13 53 34.89	9.533	11 39 20.8	52.33	16 7.02	8.85	15 41.09	0.323	14 9 15.99
25	Th	13 57 24.04	9.562	12 0 11.5	51.88	16 7.29	8.85	15 48.50	0.295	14 13 12.54
26	Fr	14 1 13.88	9.591	—12 20 51.1	—51.41	16 7.56	8.86	+15 55.22	+0.265	14 17 9.10
27	Sa	14 5 4.43	9.621	12 41 19.2	50.93	16 7.82	8.86	16 1.22	0.235	14 21 5.65
28	Su	14 8 55.71	9.652	13 1 35.4	50.43	16 8.09	8.86	16 6.49	0.204	14 25 2.20
29	Mo	14 12 47.73	9.683	13 21 39.5	49.91	16 8.35	8.86	16 11.03	0.173	14 28 58.76
30	Tu	14 16 40.51	9.715	13 41 30.9	49.37	16 8.60	8.87	16 14.80	0.141	14 32 55.31
31	We	14 20 34.07	9.748	—14 1 9.3	—48.82	16 8.86	8.87	+16 17.80	+0.108	14 36 51.87
Nov. 1	Th	14 24 28.42	9.781	14 20 34.4	48.26	16 9.11	8.87	16 20.00	0.075	14 40 48.42
2	Fr	14 28 23.57	9.815	14 39 45.7	47.68	16 9.35	8.87	16 21.40	0.042	14 44 44.98
3	Sa	14 32 19.54	9.849	14 58 42.9	47.08	16 9.59	8.87	16 21.99	+0.007	14 48 41.53
4	Su	14 36 16.34	9.884	15 17 25.4	46.46	16 9.83	8.88	16 21.75	—0.028	14 52 38.09
5	Mo	14 40 13.98	9.919	—15 35 53.0	—45.83	16 10.07	8.88	+16 20.66	—0.063	14 56 34.64
6	Tu	14 44 12.47	9.955	15 54 5.2	45.18	16 10.30	8.88	16 18.73	0.098	15 0 31.20
7	We	14 48 11.80	9.990	16 12 1.6	44.51	16 10.54	8.88	16 15.95	0.133	15 4 27.75
8	Th	14 52 11.99	10.026	16 29 41.8	43.83	16 10.77	8.88	16 12.32	0.169	15 8 24.31
9	Fr	14 56 13.04	10.062	16 47 5.3	43.13	16 10.99	8.89	16 7.82	0.205	15 12 20.87
10	Sa	15 0 14.96	10.098	—17 4 11.7	—42.41	16 11.22	8.89	+16 2.46	—0.241	15 16 17.42
11	Su	15 4 17.73	10.134	17 21 0.7	41.67	16 11.44	8.89	15 56.25	0.277	15 20 13.98
12	Mo	15 8 21.37	10.169	17 37 31.8	40.92	16 11.66	8.89	15 49.17	0.313	15 24 10.53
13	Tu	15 12 25.86	10.205	17 53 44.7	40.15	16 11.88	8.90	15 41.23	0.349	15 28 7.09
14	We	15 16 31.21	10.241	18 9 38.8	39.36	16 12.10	8.90	15 32.43	0.384	15 32 3.65
15	Th	15 20 37.41	10.276	—18 25 13.8	—38.55	16 12.31	8.90	+15 22.79	—0.419	15 36 0.20
16	Fr	15 24 44.46	10.311	—18 40 29.3	—37.73	16 12.53	8.90	+15 12.30	—0.454	15 39 56.76

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.		Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.	
		°	'	"	"	"		"	"	"	23° 27'	h m s	
Oct.	1	274	187 44	2.2	147.52	+0.33	0.000 3453	-51.9	37.64	+16.64	20.45	1.51	11 19 33.11
	2	275	188 43	3.7	147.61	0.30	0.000 2211	51.7	37.78	16.60	20.45	1.49	11 15 37.20
	3	276	189 42	7.4	147.70	0.23	0.000 0974	51.5	37.92	16.56	20.46	1.48	11 11 41.30
	4	277	190 41	13.4	147.80	0.13	9.999 9741	51.3	38.06	16.52	20.47	1.46	11 7 45.39
	5	278	191 40	21.6	147.89	+0.02	9.999 8512	51.2	38.19	16.48	20.47	1.45	11 3 49.48
	6	279	192 39	32.1	147.99	-0.10	9.999 7285	-51.1	38.33	+16.44	20.48	1.43	10 59 53.57
	7	280	193 38	45.0	148.09	0.23	9.999 6060	51.0	38.47	16.40	20.48	1.41	10 55 57.67
	8	281	194 38	0.2	148.18	0.35	9.999 4836	51.0	38.61	16.37	20.49	1.39	10 52 1.76
	9	282	195 37	17.7	148.28	0.47	9.999 3612	51.0	38.75	16.33	20.49	1.37	10 48 5.85
	10	283	196 36	37.5	148.37	0.58	9.999 2388	51.0	38.88	16.30	20.50	1.35	10 44 9.95
	11	284	197 35	59.6	148.47	-0.67	9.999 1163	-51.1	39.02	+16.26	20.51	1.33	10 40 14.04
	12	285	198 35	24.0	148.56	0.74	9.998 9936	51.2	39.16	16.23	20.51	1.31	10 36 18.13
	13	286	199 34	50.6	148.65	0.79	9.998 8707	51.2	39.30	16.20	20.52	1.29	10 32 22.22
	14	287	200 34	19.3	148.74	0.80	9.998 7476	51.3	39.43	16.16	20.52	1.27	10 28 26.31
	15	288	201 33	50.1	148.83	0.79	9.998 6243	51.4	39.57	16.13	20.53	1.25	10 24 30.41
	16	289	202 33	23.1	148.91	-0.76	9.998 5008	-51.5	39.71	+16.10	20.54	1.22	10 20 34.50
	17	290	203 32	58.0	149.00	0.70	9.998 3772	51.5	39.85	16.07	20.54	1.20	10 16 38.59
	18	291	204 32	34.9	149.08	0.62	9.998 2534	51.6	39.98	16.05	20.55	1.18	10 12 42.68
	19	292	205 32	13.7	149.16	0.50	9.998 1295	51.6	40.12	16.02	20.55	1.15	10 8 46.78
	20	293	206 31	54.3	149.23	0.38	9.998 0057	51.6	40.26	16.00	20.56	1.13	10 4 50.87
	21	294	207 31	36.7	149.30	-0.25	9.997 8820	-51.5	40.40	+15.97	20.56	1.10	10 0 54.96
	22	295	208 31	20.8	149.37	-0.13	9.997 7587	51.3	40.53	15.95	20.57	1.08	9 56 59.05
	23	296	209 31	6.6	149.44	0.00	9.997 6357	51.1	40.67	15.93	20.58	1.05	9 53 3.14
	24	297	210 30	54.1	149.51	+0.11	9.997 5135	50.8	40.81	15.91	20.58	1.02	9 49 7.24
	25	298	211 30	43.2	149.58	0.20	9.997 3920	50.4	40.95	15.89	20.59	1.00	9 45 11.33
	26	299	212 30	34.0	149.65	+0.26	9.997 2716	-49.9	41.08	+15.87	20.59	0.97	9 41 15.42
	27	300	213 30	26.5	149.72	0.29	9.997 1523	49.5	41.22	15.85	20.60	0.94	9 37 19.51
	28	301	214 30	20.7	149.80	0.29	9.997 0343	48.9	41.36	15.84	20.60	0.91	9 33 23.60
	29	302	215 30	16.8	149.87	0.26	9.996 9178	48.2	41.50	15.83	20.61	0.89	9 29 27.69
	30	303	216 30	14.6	149.95	0.19	9.996 8028	47.6	41.63	15.82	20.62	0.86	9 25 31.79
	31	304	217 30	14.4	150.03	+0.09	9.996 6893	-46.9	41.77	+15.80	20.62	0.83	9 21 35.88
Nov.	1	305	218 30	16.2	150.11	-0.02	9.996 5775	46.3	41.91	15.80	20.63	0.80	9 17 39.97
	2	306	219 30	19.9	150.20	0.15	9.996 4671	45.7	42.05	15.79	20.63	0.77	9 13 44.06
	3	307	220 30	25.7	150.28	0.28	9.996 3582	45.1	42.19	15.78	20.64	0.74	9 9 48.15
	4	308	221 30	33.6	150.37	0.40	9.996 2508	44.5	42.32	15.78	20.64	0.72	9 5 52.24
	5	309	222 30	43.5	150.46	-0.53	9.996 1446	-44.0	42.46	+15.78	20.65	0.69	9 1 56.33
	6	310	223 30	55.6	150.55	0.64	9.996 0397	43.5	42.60	15.78	20.65	0.66	8 58 0.42
	7	311	224 31	9.7	150.63	0.73	9.995 9359	43.0	42.74	15.78	20.66	0.63	8 54 4.51
	8	312	225 31	25.8	150.71	0.80	9.995 8333	42.6	42.87	15.78	20.66	0.60	8 50 8.60
	9	313	226 31	43.9	150.79	0.84	9.995 7316	42.1	43.01	15.78	20.67	0.57	8 46 12.69
	10	314	227 32	3.9	150.87	-0.86	9.995 6310	-41.7	43.15	+15.79	20.67	0.54	8 42 16.78
	11	315	228 32	25.9	150.96	0.85	9.995 5313	41.3	43.29	15.80	20.68	0.51	8 38 20.87
	12	316	229 32	49.7	151.03	0.81	9.995 4325	41.0	43.42	15.80	20.68	0.48	8 34 24.96
	13	317	230 33	15.3	151.10	0.76	9.995 3345	40.7	43.56	15.81	20.69	0.45	8 30 29.05
	14	318	231 33	42.6	151.17	0.68	9.995 2373	40.3	43.70	15.83	20.69	0.42	8 26 33.14
	15	319	232 34	11.5	151.24	-0.56	9.995 1410	-40.0	43.84	+15.84	20.69	0.39	8 22 37.23
	16	320	233 34	42.0	151.30	-0.44	9.995 0455	-39.6	43.97	+15.86	20.70	0.37	8 18 41.32



FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s
Nov. 16	Fr	15	24	44.46	10.811	—18	40	29.3	—37.73	16	12.53	8.90	+15 12.30	—0.454	15	39 56.76
17	Sa	15	28	52.34	10.845	18	55	24.9	36.90	16	12.74	8.90	15 0.98	0.489	15	43 53.31
18	Su	15	33	1.04	10.880	19	10	0.2	36.05	16	12.95	8.90	14 48.83	0.523	15	47 49.87
19	Mo	15	37	10.56	10.413	19	24	14.9	35.18	16	13.16	8.91	14 35.87	0.557	15	51 46.43
20	Tu	15	41	20.88	10.447	19	38	8.5	34.29	16	13.36	8.91	14 22.10	0.590	15	55 42.98
21	We	15	45	32.00	10.480	—19	51	40.6	—33.39	16	13.56	8.91	+14 7.54	—0.623	15	59 39.54
22	Th	15	49	43.90	10.512	20	4	51.0	32.48	16	13.76	8.91	13 52.19	0.655	16	3 36.10
23	Fr	15	53	56.58	10.544	20	17	39.3	31.54	16	13.96	8.91	13 36.08	0.687	16	7 32.65
24	Sa	15	58	10.02	10.576	20	30	5.0	30.60	16	14.14	8.92	13 19.20	0.719	16	11 29.21
25	Su	16	2	24.21	10.607	20	42	8.0	29.65	16	14.33	8.92	13 1.56	0.750	16	15 25.77
26	Mo	16	6	39.14	10.637	—20	53	47.9	—28.68	16	14.51	8.92	+12 43.19	—0.781	16	19 22.33
27	Tu	16	10	54.80	10.668	21	5	4.3	27.69	16	14.69	8.92	12 24.09	0.811	16	23 18.88
28	We	16	15	11.18	10.697	21	15	57.0	26.70	16	14.86	8.92	12 4.26	0.841	16	27 15.44
29	Th	16	19	28.26	10.726	21	26	25.6	25.69	16	15.02	8.92	11 43.73	0.870	16	31 12.00
30	Fr	16	23	46.04	10.755	21	36	29.8	24.66	16	15.18	8.93	11 22.51	0.898	16	35 8.55
Dec. 1	Sa	16	28	4.50	10.783	—21	46	9.4	—23.63	16	15.34	8.93	+11 0.61	—0.926	16	39 5.11
2	Su	16	32	23.62	10.810	21	55	24.0	22.58	16	15.49	8.93	10 38.05	0.953	16	43 1.67
3	Mo	16	36	43.38	10.836	22	4	13.3	21.52	16	15.63	8.93	10 14.85	0.980	16	46 58.23
4	Tu	16	41	3.76	10.862	22	12	37.1	20.46	16	15.77	8.93	9 51.02	1.006	16	50 54.79
5	We	16	45	24.75	10.887	22	20	35.1	19.38	16	15.90	8.93	9 26.60	1.030	16	54 51.34
6	Th	16	49	46.31	10.910	—22	28	7.1	—18.29	16	16.03	8.93	+ 9 1.59	—1.054	16	58 47.90
7	Fr	16	54	8.42	10.932	22	35	12.8	17.19	16	16.15	8.93	8 36.04	1.076	17	2 44.46
8	Sa	16	58	31.05	10.954	22	41	52.0	16.08	16	16.27	8.94	8 9.96	1.097	17	6 41.02
9	Su	17	2	54.18	10.974	22	48	4.4	14.96	16	16.39	8.94	7 43.39	1.117	17	10 37.58
10	Mo	17	7	17.78	10.993	22	53	49.9	13.83	16	16.50	8.94	7 16.35	1.136	17	14 34.13
11	Tu	17	11	41.82	11.010	—22	59	8.3	—12.70	16	16.61	8.94	+ 6 48.87	—1.153	17	18 30.69
12	We	17	16	6.25	11.026	23	3	59.3	11.56	16	16.71	8.94	6 21.00	1.169	17	22 27.25
13	Th	17	20	31.05	11.041	23	8	22.9	10.41	16	16.82	8.94	5 52.75	1.184	17	26 23.81
14	Fr	17	24	56.19	11.054	23	12	18.8	9.25	16	16.91	8.94	5 24.18	1.197	17	30 20.37
15	Sa	17	29	21.62	11.065	23	15	47.0	8.09	16	17.01	8.94	4 55.30	1.209	17	34 16.92
16	Su	17	33	47.31	11.075	—23	18	47.3	—6.93	16	17.10	8.94	+ 4 26.17	—1.219	17	38 13.48
17	Mo	17	38	13.22	11.084	23	21	19.6	5.76	16	17.18	8.94	3 56.82	1.227	17	42 10.04
18	Tu	17	42	39.32	11.091	23	23	23.8	4.59	16	17.27	8.94	3 27.28	1.234	17	46 6.60
19	We	17	47	5.56	11.096	23	24	59.9	3.42	16	17.35	8.95	2 57.60	1.239	17	50 3.16
20	Th	17	51	31.91	11.100	23	26	7.9	2.24	16	17.42	8.95	2 27.81	1.243	17	53 59.72
21	Fr	17	55	58.33	11.102	—23	26	47.6	—1.07	16	17.49	8.95	+ 1 57.94	—1.245	17	57 56.27
22	Sa	18	0	24.79	11.103	23	26	59.1	+ 0.11	16	17.56	8.95	1 28.04	1.246	18	1 52.83
23	Su	18	4	51.26	11.103	23	26	42.4	1.29	16	17.61	8.95	0 58.13	1.246	18	5 49.39
24	Mo	18	9	17.70	11.101	23	25	57.4	2.46	16	17.67	8.95	+ 0 28.24	1.244	18	9 45.95
25	Tu	18	13	44.09	11.098	23	24	44.2	3.64	16	17.72	8.95	— 0 1.58	1.241	18	13 42.51
26	We	18	18	10.38	11.093	—23	23	2.8	+ 4.81	16	17.76	8.95	— 0 31.32	—1.237	18	17 39.07
27	Th	18	22	36.56	11.088	23	20	53.3	5.98	16	17.80	8.95	1 0.94	1.231	18	21 35.62
28	Fr	18	27	2.59	11.081	23	18	15.6	7.15	16	17.83	8.95	1 30.41	1.225	18	25 32.18
29	Sa	18	31	28.45	11.073	23	15	9.9	8.32	16	17.85	8.95	1 59.71	1.217	18	29 28.74
30	Su	18	35	54.10	11.064	23	11	36.2	9.48	16	17.87	8.95	2 28.80	1.208	18	33 25.30
31	Mo	18	40	19.51	11.053	—23	7	34.7	+10.64	16	17.88	8.95	— 2 57.66	—1.197	18	37 21.86
32	Tu	18	44	44.66	11.042	—23	3	5.4	+11.80	16	17.88	8.95	— 3 26.25	—1.185	18	41 18.41

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" "	"	"			"	"	"	23° 26'	h m s
Nov. 16	320	233 34 42.0	151.30	-0.44	9.995 0455	-39.6	43.97	+15.86	20.70	60.37	8 18 41.32
17	321	234 35 14.0	151.36	0.31	9.994 9510	39.2	44.11	15.87	20.70	60.34	8 14 45.41
18	322	235 35 47.4	151.42	0.17	9.994 8574	38.8	44.25	15.89	20.71	60.31	8 10 49.50
19	323	236 36 22.0	151.47	-0.04	9.994 7649	38.3	44.39	15.91	20.71	60.28	8 6 53.59
20	324	237 36 57.9	151.52	+0.08	9.994 6736	37.8	44.52	15.93	20.72	60.25	8 2 57.68
21	325	238 37 35.0	151.57	+0.17	9.994 5837	-37.1	44.66	+15.95	20.72	60.23	7 59 1.77
22	326	239 38 13.2	151.61	0.24	9.994 4955	36.4	44.80	15.98	20.73	60.20	7 55 5.86
23	327	240 38 52.5	151.66	0.28	9.994 4089	35.7	44.94	16.00	20.73	60.17	7 51 9.95
24	328	241 39 32.9	151.71	0.29	9.994 3243	34.8	45.08	16.03	20.73	60.14	7 47 14.04
25	329	242 40 14.4	151.75	0.27	9.994 2417	34.0	45.21	16.06	20.74	60.12	7 43 18.13
26	330	243 40 57.0	151.80	+0.21	9.994 1613	-33.0	45.35	+16.09	20.74	60.09	7 39 22.21
27	331	244 41 40.7	151.85	0.12	9.994 0832	32.0	45.49	16.12	20.75	60.07	7 35 26.30
28	332	245 42 25.7	151.90	+0.02	9.994 0076	31.0	45.63	16.15	20.75	60.04	7 31 30.39
29	333	246 43 11.8	151.95	-0.10	9.993 9344	30.0	45.76	16.19	20.75	60.02	7 27 34.48
30	334	247 43 59.2	152.00	0.23	9.993 8636	29.0	45.90	16.22	20.76	59.99	7 23 38.57
Dec. 1	335	248 44 47.9	152.06	-0.36	9.993 7953	-28.0	46.04	+16.25	20.76	59.97	7 19 42.66
2	336	249 45 38.0	152.11	0.49	9.993 7294	27.0	46.18	16.29	20.76	59.95	7 15 46.74
3	337	250 46 29.3	152.17	0.60	9.993 6658	26.0	46.31	16.33	20.76	59.92	7 11 50.83
4	338	251 47 22.0	152.22	0.71	9.993 6044	25.1	46.45	16.37	20.77	59.90	7 7 54.92
5	339	252 48 16.0	152.28	0.78	9.993 5451	24.2	46.59	16.41	20.77	59.88	7 3 59.01
6	340	253 49 11.2	152.33	-0.84	9.993 4880	-23.4	46.73	+16.45	20.77	59.86	7 0 3.10
7	341	254 50 7.8	152.38	0.85	9.993 4328	22.6	46.86	16.49	20.78	59.84	6 56 7.18
8	342	255 51 5.5	152.43	0.85	9.993 3796	21.8	47.00	16.53	20.78	59.82	6 52 11.27
9	343	256 52 4.4	152.48	0.82	9.993 3282	21.1	47.14	16.58	20.78	59.80	6 48 15.36
10	344	257 53 4.4	152.52	0.76	9.993 2785	20.3	47.28	16.62	20.78	59.78	6 44 19.45
11	345	258 54 5.5	152.57	-0.68	9.993 2306	-19.6	47.41	+16.67	20.79	59.77	6 40 23.54
12	346	259 55 7.6	152.60	0.58	9.993 1842	19.0	47.55	16.71	20.79	59.75	6 36 27.62
13	347	260 56 10.6	152.64	0.46	9.993 1394	18.4	47.69	16.76	20.79	59.73	6 32 31.71
14	348	261 57 14.4	152.67	0.31	9.993 0960	17.8	47.83	16.81	20.79	59.72	6 28 35.80
15	349	262 58 18.9	152.70	0.17	9.993 0542	17.1	47.96	16.85	20.79	59.70	6 24 39.89
16	350	263 59 24.0	152.72	-0.04	9.993 0139	-16.5	48.10	+16.90	20.80	59.69	6 20 43.98
17	351	265 0 29.6	152.74	+0.09	9.992 9751	15.8	48.24	16.95	20.80	59.67	6 16 48.06
18	352	266 1 35.6	152.76	0.21	9.992 9380	15.1	48.38	17.00	20.80	59.66	6 12 52.15
19	353	267 2 41.9	152.77	0.29	9.992 9027	14.3	48.52	17.04	20.80	59.65	6 8 56.24
20	354	268 3 48.4	152.78	0.35	9.992 8693	13.5	48.65	17.09	20.80	59.63	6 5 0.33
21	355	269 4 55.1	152.78	+0.37	9.992 8381	-12.6	48.79	+17.14	20.80	59.62	6 1 4.41
22	356	270 6 2.0	152.79	0.35	9.992 8090	11.6	48.93	17.19	20.81	59.61	5 57 8.50
23	357	271 7 9.0	152.79	0.31	9.992 7824	10.6	49.07	17.24	20.81	59.60	5 53 12.59
24	358	272 8 16.1	152.80	0.23	9.992 7583	9.5	49.20	17.29	20.81	59.59	5 49 16.67
25	359	273 9 23.4	152.81	0.14	9.992 7368	8.4	49.34	17.34	20.81	59.59	5 45 20.76
26	360	274 10 30.7	152.81	+0.02	9.992 7181	- 7.2	49.48	+17.39	20.81	59.58	5 41 24.85
27	361	275 11 38.2	152.82	-0.12	9.992 7022	6.0	49.62	17.43	20.81	59.57	5 37 28.94
28	362	276 12 45.9	152.82	0.24	9.992 6891	4.8	49.75	17.48	20.81	59.57	5 33 33.03
29	363	277 13 53.8	152.83	0.37	9.992 6790	3.6	49.89	17.53	20.81	59.56	5 29 37.11
30	364	278 15 1.9	152.84	0.50	9.992 6716	2.5	50.03	17.58	20.81	59.56	5 25 41.20
31	365	279 16 10.2	152.85	-0.61	9.992 6670	- 1.4	50.17	+17.62	20.81	59.55	5 21 45.29
32	366	280 17 18.8	152.86	-0.69	9.992 6651	- 0.2	50.30	+17.67	20.81	59.55	5 17 49.38

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Jan. 1	+0.179 8639	+0.188 4540	−776	−0.886 8288	−0.885 3217	−184	−0.384 6965	−0.384 0428	+ 60
2	0.197 0291	0.205 5885	782	0.883 7459	0.882 1013	198	0.383 3592	0.382 6459	54
3	0.214 1317	0.222 6579	788	0.880 3884	0.878 6071	212	0.381 9030	0.381 1305	47
4	0.231 1666	0.239 6571	793	0.876 7579	0.874 8408	226	0.380 3284	0.379 4971	40
5	0.248 1287	0.256 5809	798	0.872 8560	0.870 8035	241	0.378 6364	0.377 7463	33
6	+0.265 0131	+0.273 4247	−803	−0.868 6836	−0.866 4962	−256	−0.376 8270	−0.375 8785	+ 26
7	0.281 8150	0.290 1834	807	0.864 2419	0.861 9207	271	0.374 9009	0.373 8943	19
8	0.298 5293	0.306 8522	811	0.859 5328	0.857 0782	286	0.372 8588	0.371 7943	12
9	0.315 1513	0.323 4261	814	0.854 5572	0.851 9699	302	0.370 7010	0.369 5790	+ 4
10	0.331 6759	0.339 9002	817	0.849 3167	0.846 5978	318	0.368 4284	0.367 2493	− 3
11	+0.348 0983	+0.356 2696	−820	−0.843 8133	−0.840 9634	−334	−0.366 0417	−0.364 8057	− 11
12	0.364 4135	0.372 5295	822	0.838 0482	0.835 0679	350	0.363 5413	0.362 2487	18
13	0.380 6169	0.388 6751	824	0.832 0228	0.828 9130	366	0.360 9279	0.359 5790	26
14	0.396 7034	0.404 7011	826	0.825 7388	0.822 5005	382	0.358 2022	0.356 7975	34
15	0.412 6678	0.420 6029	827	0.819 1982	0.815 8322	399	0.355 3651	0.353 9050	42
16	+0.428 5056	+0.436 3754	−827	−0.812 4027	−0.808 9098	−415	−0.352 4172	−0.350 9019	− 50
17	0.444 2116	0.452 0137	827	0.805 3539	0.801 7353	432	0.349 3593	0.347 7894	58
18	0.459 7809	0.467 5127	827	0.798 0542	0.794 3107	448	0.346 1924	0.344 5683	66
19	0.475 2084	0.482 8674	827	0.790 5052	0.786 6379	465	0.342 9172	0.341 2394	74
20	0.490 4890	0.498 0726	826	0.782 7092	0.778 7194	482	0.339 5349	0.337 8038	82
21	+0.505 6175	+0.513 1232	−824	−0.774 6688	−0.770 5576	−499	−0.336 0463	−0.334 2626	− 90
22	0.520 5889	0.528 0140	822	0.766 3862	0.762 1548	516	0.332 4527	0.330 6168	98
23	0.535 3980	0.542 7402	820	0.757 8639	0.753 5140	533	0.328 7551	0.326 8678	107
24	0.550 0400	0.557 2968	817	0.749 1053	0.744 6382	550	0.324 9552	0.323 0172	116
25	0.564 5100	0.571 6790	813	0.740 1132	0.735 5308	567	0.321 0539	0.319 0657	124
26	+0.578 8032	+0.585 8821	−809	−0.730 8912	−0.726 1949	−584	−0.317 0528	−0.315 0154	−132
27	0.592 9153	0.599 9021	805	0.721 4423	0.716 6338	601	0.312 9537	0.310 8678	141
28	0.606 8421	0.613 7347	800	0.711 7699	0.706 8510	618	0.308 7578	0.306 6240	150
29	0.620 5793	0.627 3755	795	0.701 8775	0.696 8500	635	0.304 4665	0.302 2856	158
30	0.634 1229	0.640 8210	789	0.691 7687	0.686 6340	652	0.300 0815	0.297 8543	166
31	+0.647 4693	+0.654 0673	−783	−0.681 4466	−0.676 2068	−668	−0.295 6043	−0.293 3316	−175
Feb. 1	0.660 6145	0.667 1105	776	0.670 9150	0.665 5718	685	0.291 0363	0.288 7187	184
2	0.673 5549	0.679 9472	769	0.660 1774	0.654 7323	701	0.286 3790	0.284 0172	192
3	0.686 2870	0.692 5738	761	0.649 2370	0.643 6920	718	0.281 6336	0.279 2285	200
4	0.698 8071	0.704 9866	753	0.638 0976	0.632 4542	734	0.276 8021	0.274 3544	209
5	+0.711 1118	+0.717 1824	−744	−0.626 7622	−0.621 0222	−750	−0.271 8857	−0.269 3961	−218
6	0.723 1980	0.729 1580	735	0.615 2346	0.609 3999	766	0.266 8858	0.264 3550	226
7	0.735 0620	0.740 9096	726	0.603 5184	0.597 5906	782	0.261 8040	0.259 2329	234
8	0.746 7004	0.752 4341	716	0.591 6171	0.585 5981	798	0.256 6419	0.254 0311	243
9	0.758 1102	0.763 7282	706	0.579 5342	0.573 4257	814	0.251 4007	0.248 7511	252
10	+0.769 2877	+0.774 7886	−695	−0.567 2731	−0.561 0768	−830	−0.246 0823	−0.243 3945	−260
11	0.780 2304	0.785 6124	684	0.554 8374	0.548 5553	845	0.240 6880	0.237 9629	268
12	0.790 9344	0.796 1960	672	0.542 2310	0.535 8648	860	0.235 2194	0.232 4578	277
13	0.801 3967	0.806 5363	660	0.529 4572	0.523 0089	875	0.229 6781	0.226 8807	286
14	0.811 6142	0.816 6300	647	0.516 5203	0.509 9916	890	0.224 0658	0.221 2335	294
15	+0.821 5833	+0.826 4739	−634	−0.503 4235	−0.496 8164	−904	−0.218 3841	−0.215 5177	−302
16	+0.831 3013	+0.836 0651	−621	−0.490 1709	−0.483 4874	−918	−0.212 6346	−0.209 7350	−310

## GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Feb. 16	+0.831 3013	+0.836 0651	-621	-0.490 1709	-0.483 4874	- 918	-0.212 6346	-0.209 7350	-310
17	0.840 7648	0.845 4001	607	0.476 7665	0.470 0086	932	0.206 8192	0.203 8873	319
18	0.849 9706	0.854 4760	593	0.463 2144	0.456 3842	946	0.200 9396	0.197 9764	327
19	0.858 9158	0.863 2896	578	0.449 5187	0.442 6185	959	0.194 9979	0.192 0043	335
20	0.867 5970	0.871 8377	563	0.435 6841	0.428 7161	972	0.188 9958	0.185 9728	343
21	+0.876 0114	+0.880 1179	-548	-0.421 7150	-0.414 6814	- 985	-0.182 9355	-0.179 8841	-351
22	0.884 1567	0.888 1276	532	0.407 6160	0.400 5192	998	0.176 8189	0.173 7402	359
23	0.892 0302	0.895 8643	516	0.393 3918	0.386 2345	1010	0.170 6482	0.167 5433	367
24	0.899 6296	0.903 3259	499	0.379 0477	0.371 8320	1022	0.164 4256	0.161 2954	374
25	0.906 9529	0.910 5105	482	0.364 5880	0.357 3165	1034	0.158 1531	0.154 9989	381
26	+0.913 9983	+0.917 4162	-465	-0.350 0181	-0.342 6933	-1046	-0.151 8330	-0.148 6557	-389
27	0.920 7640	0.924 0414	448	0.335 3427	0.327 9668	1057	0.145 4671	0.142 2676	397
28	0.927 2483	0.930 3845	430	0.320 5663	0.313 1416	1068	0.139 0575	0.135 8370	404
Mar. 1	0.933 4499	0.936 4444	412	0.305 6935	0.298 2226	1079	0.132 6064	0.129 3658	412
2	0.939 3677	0.942 2197	393	0.290 7293	0.283 2143	1089	0.126 1156	0.122 8559	419
3	+0.945 0003	+0.947 7092	-374	-0.275 6781	-0.268 1213	-1099	-0.119 5870	-0.116 3092	-426
4	0.950 3464	0.952 9117	355	0.260 5444	0.252 9482	1109	0.113 0228	0.109 7279	433
5	0.955 4050	0.957 8262	336	0.245 3332	0.237 6998	1118	0.106 4249	0.103 1139	440
6	0.960 1750	0.962 4513	316	0.230 0487	0.222 3804	1127	0.099 7952	0.096 4690	446
7	0.964 6551	0.966 7864	296	0.214 6954	0.206 9944	1136	0.093 1355	0.089 7951	453
8	+0.968 8450	+0.970 8306	-276	-0.199 2779	-0.191 5464	-1144	-0.086 4479	-0.083 0942	-459
9	0.972 7432	0.974 5826	256	0.183 8006	0.176 0409	1152	0.079 7342	0.076 3682	466
10	0.976 3489	0.978 0420	235	0.168 2680	0.160 4823	1159	0.072 9964	0.069 6190	472
11	0.979 6616	0.981 2078	214	0.152 6844	0.144 8749	1166	0.066 2363	0.062 8485	478
12	0.982 6804	0.984 0793	193	0.137 0543	0.129 2232	1173	0.059 4558	0.056 0586	484
13	+0.985 4044	+0.986 6556	-172	-0.121 3822	-0.113 5318	-1180	-0.052 6571	-0.049 2515	-490
14	0.987 8329	0.988 9360	150	0.105 6726	0.097 8051	1186	0.045 8420	0.042 4288	495
15	0.989 9650	0.990 9198	128	0.089 9299	0.082 0476	1192	0.039 0123	0.035 5927	501
16	0.991 8002	0.992 6062	106	0.074 1588	0.066 2640	1197	0.032 1703	0.028 7452	506
17	0.993 3377	0.993 9944	84	0.058 3638	0.050 4588	1203	0.025 3178	0.021 8883	511
18	+0.994 5765	+0.995 0839	- 62	-0.042 5496	-0.034 6369	-1208	-0.018 4570	-0.015 0241	-516
19	0.995 5166	0.995 8745	39	0.026 7213	0.018 8033	1212	0.011 5900	0.008 1549	521
20	0.996 1575	0.996 3655	- 16	-0.010 8836	-0.002 9628	1216	-0.004 7190	-0.001 2827	526
21	0.996 4986	0.996 5568	+ 7	+0.004 9584	+0.012 8795	1219	+0.002 1537	+0.005 5900	531
22	0.996 5402	0.996 4487	30	0.020 7997	0.028 7184	1222	0.009 0259	0.012 4612	535
23	+0.996 2823	+0.996 0411	+ 53	+0.036 6350	+0.044 5489	-1225	+0.015 8954	+0.019 3284	-539
24	0.995 7250	0.995 3343	77	0.052 4593	0.060 3657	1228	0.022 7599	0.026 1896	543
25	0.994 8691	0.994 3294	100	0.068 2674	0.076 1638	1230	0.029 6173	0.033 0426	547
26	0.993 7151	0.993 0266	124	0.084 0542	0.091 9381	1232	0.036 4652	0.039 8850	550
27	0.992 2642	0.991 4278	148	0.099 8149	0.107 6840	1234	0.043 3018	0.046 7151	554
28	+0.990 5176	+0.989 5335	+172	+0.115 5448	+0.123 3966	-1235	+0.050 1248	+0.053 5306	-557
29	0.988 4758	0.987 3448	196	0.131 2388	0.139 0710	1236	0.056 9322	0.060 3294	560
30	0.986 1405	0.984 8632	220	0.146 8925	0.154 7028	1237	0.063 7220	0.067 1098	563
31	0.983 5129	0.982 0898	244	0.162 5012	0.170 2873	1237	0.070 4924	0.073 8696	566
Apr. 1	0.980 5941	0.979 0260	269	0.178 0604	0.185 8201	1237	0.077 2412	0.080 6070	568
2	+0.977 3858	+0.975 6734	+294	+0.193 5659	+0.201 2970	-1236	+0.083 9667	+0.087 3202	-570
3	+0.973 8891	+0.972 0331	+318	+0.209 0130	+0.216 7134	-1235	+0.090 6671	+0.094 0072	-572



SUN, 1917.

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
or. 1	+0.980 5941	+0.979 0260	+ 269	+0.178 0604	+0.185 8201	-1237	+0.077 2412	+0.080 6070	-568
2	0.977 3858	0.975 6734	294	0.193 5659	0.201 2970	1236	0.083 9667	0.087 3202	570
3	0.973 8891	0.972 0331	318	0.209 0130	0.216 7134	1235	0.090 6671	0.094 0072	572
4	0.970 1056	0.968 1067	343	0.224 3976	0.232 0651	1234	0.097 3403	0.100 6663	574
5	0.966 0367	0.963 8958	368	0.239 7153	0.247 3478	1232	0.103 9848	0.107 2955	576
6	+0.961 6842	+0.959 4022	+ 392	+0.254 9620	+0.262 5574	-1230	+0.110 5984	+0.113 8932	-578
7	0.957 0498	0.954 6272	417	0.270 1335	0.277 6898	1228	0.117 1797	0.120 4575	579
8	0.952 1346	0.949 5721	442	0.285 2257	0.292 7409	1225	0.123 7266	0.126 9867	580
9	0.946 9400	0.944 2387	467	0.300 2347	0.307 7066	1222	0.130 2376	0.133 4790	581
10	0.941 4685	0.938 6293	493	0.315 1561	0.322 5828	1219	0.136 7108	0.139 9327	582
11	+0.935 7212	+0.932 7444	+ 518	+0.329 9862	+0.337 3657	-1215	+0.143 1444	+0.146 3459	-582
12	0.929 6993	0.926 5861	543	0.344 7208	0.352 0510	1211	0.149 5368	0.152 7169	583
13	0.923 4049	0.920 1560	568	0.359 3557	0.366 6345	1206	0.155 8859	0.159 0437	583
14	0.916 8396	0.913 4560	594	0.373 8869	0.381 1123	1201	0.162 1901	0.165 3248	583
15	0.910 0052	0.906 4874	619	0.388 3100	0.395 4797	1196	0.168 4474	0.171 5578	583
16	+0.902 9031	+0.899 2525	+ 644	+0.402 6208	+0.409 7328	-1190	+0.174 6558	+0.177 7412	-582
17	0.895 5359	0.891 7535	669	0.416 8151	0.423 8671	1184	0.180 8137	0.183 8730	581
18	0.887 9056	0.883 9923	694	0.430 8883	0.437 8783	1178	0.186 9189	0.189 9512	580
19	0.880 0139	0.875 9709	719	0.444 8363	0.451 7618	1171	0.192 9696	0.195 9738	579
20	0.871 8637	0.867 6925	744	0.458 6543	0.465 5134	1164	0.198 9637	0.201 9391	577
21	+0.863 4578	+0.859 1599	+ 769	+0.472 3384	+0.479 1288	-1157	+0.204 8996	+0.207 8451	-575
22	0.854 7990	0.850 3755	794	0.485 8841	0.492 6039	1149	0.210 7754	0.213 6902	573
23	0.845 8898	0.841 3425	820	0.499 2875	0.505 9345	1141	0.216 5892	0.219 4723	570
24	0.836 7340	0.832 0645	845	0.512 5444	0.519 1168	1133	0.222 3393	0.225 1900	568
25	0.827 3344	0.822 5442	870	0.525 6511	0.532 1469	1124	0.228 0242	0.230 8416	565
26	+0.817 6945	+0.812 7854	+ 895	+0.538 6038	+0.545 0212	-1115	+0.233 6421	+0.236 4255	-562
27	0.807 8174	0.802 7911	920	0.551 3988	0.557 7361	1105	0.239 1917	0.241 9404	559
28	0.797 7068	0.792 5648	945	0.564 0326	0.570 2880	1095	0.244 6714	0.247 3846	556
29	0.787 3657	0.782 1099	970	0.576 5018	0.582 6736	1085	0.250 0797	0.252 7567	553
30	0.776 7977	0.771 4295	995	0.588 8030	0.594 8897	1074	0.255 4153	0.258 0554	549
ay 1	+0.766 0060	+0.760 5275	+1020	+0.600 9333	+0.606 9332	-1063	+0.260 6767	+0.263 2791	-545
2	0.754 9945	0.749 4073	1045	0.612 8892	0.618 8008	1052	0.265 8625	0.268 4268	541
3	0.743 7664	0.738 0721	1069	0.624 6677	0.630 4894	1040	0.270 9717	0.273 4970	536
4	0.732 3251	0.726 5257	1093	0.636 2657	0.641 9963	1028	0.276 0027	0.278 4886	531
5	0.720 6743	0.714 7713	1118	0.647 6807	0.653 3185	1015	0.280 9544	0.283 4000	526
6	+0.708 8171	+0.702 8122	+1142	+0.658 9094	+0.664 4532	-1002	+0.285 8254	+0.288 2303	-521
7	0.696 7569	0.690 6518	1166	0.669 9495	0.675 3977	989	0.290 6147	0.292 9783	516
8	0.684 4973	0.678 2938	1190	0.680 7977	0.686 1491	975	0.295 3209	0.297 6425	510
9	0.672 0418	0.665 7415	1214	0.691 4516	0.696 7048	961	0.299 9430	0.302 2221	504
10	0.659 3934	0.652 9979	1238	0.701 9084	0.707 0619	946	0.304 4796	0.306 7154	498
11	+0.646 5555	+0.640 0665	+1261	+0.712 1650	+0.717 2175	- 931	+0.308 9294	+0.311 1214	-492
12	0.633 5315	0.626 9508	1285	0.722 2190	0.727 1691	916	0.313 2913	0.315 4388	486
13	0.620 3249	0.613 6542	1308	0.732 0673	0.736 9133	900	0.317 5638	0.319 6662	479
14	0.606 9392	0.600 1805	1331	0.741 7067	0.746 4473	884	0.321 7458	0.323 8024	472
15	0.593 3784	0.586 5334	1354	0.751 1346	0.755 7683	868	0.325 8359	0.327 8460	465
16	+0.579 6460	+0.572 7166	+1377	+0.760 3480	+0.764 8735	- 851	+0.329 8326	+0.331 7957	-458
17	+0.565 7458	+0.558 7343	+1400	+0.769 3443	+0.773 7600	- 834	+0.333 7351	+0.335 6505	-450

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
May 17	+0.565 7458	+0.558 7343	+1400	+0.769 3443	+0.773 7600	-834	+0.333 7351	+0.335 6505	-450
18	0.551 6824	0.544 5907	1422	0.778 1202	0.782 4248	816	0.337 5419	0.339 4090	442
19	0.537 4598	0.530 2901	1444	0.786 6734	0.790 8655	798	0.341 2517	0.343 0700	434
20	0.523 0823	0.515 8370	1466	0.795 0010	0.799 0795	780	0.344 8636	0.346 6325	426
21	0.508 5547	0.501 2359	1488	0.803 1008	0.807 0644	761	0.348 3766	0.350 0956	417
22	+0.493 8813	+0.486 4913	+1509	+0.810 9701	+0.814 8177	-742	+0.351 7895	+0.353 4581	-409
23	0.479 0666	0.471 6078	1530	0.818 6069	0.822 3374	722	0.355 1014	0.356 7192	400
24	0.464 1156	0.456 5905	1551	0.826 0090	0.829 6214	702	0.358 3115	0.359 8781	391
25	0.449 0330	0.441 4437	1572	0.833 1744	0.836 6679	682	0.361 4189	0.362 9340	382
26	0.433 8232	0.426 1721	1592	0.840 1017	0.843 4754	661	0.364 4232	0.365 8863	373
27	+0.418 4909	+0.410 7802	+1612	+0.846 7888	+0.850 0419	-640	+0.367 3233	+0.368 7341	-363
28	0.403 0406	0.395 2728	1632	0.853 2343	0.856 3659	618	0.370 1186	0.371 4768	353
29	0.387 4772	0.379 6544	1652	0.859 4366	0.862 4462	596	0.372 8087	0.374 1140	343
30	0.371 8050	0.363 9296	1671	0.865 3946	0.868 2814	574	0.375 3928	0.376 6450	333
31	0.356 0288	0.348 1031	1690	0.871 1066	0.873 8700	551	0.377 8704	0.379 0691	322
June 1	+0.340 1531	+0.332 1794	+1709	+0.876 5714	+0.879 2107	-528	+0.380 2409	+0.381 3859	-312
2	0.324 1826	0.316 1631	1727	0.881 7879	0.884 3028	504	0.382 5040	0.383 5950	301
3	0.308 1214	0.300 0582	1745	0.886 7553	0.889 1453	480	0.384 6590	0.385 6960	290
4	0.291 9740	0.283 8694	1762	0.891 4726	0.893 7370	456	0.386 7057	0.387 6881	279
5	0.275 7449	0.267 6009	1779	0.895 9385	0.898 0769	431	0.388 6433	0.389 5712	268
6	+0.259 4381	+0.251 2569	+1796	+0.900 1521	+0.902 1641	-406	+0.390 4718	+0.391 3449	-256
7	0.243 0579	0.234 8415	1812	0.904 1128	0.905 9979	381	0.392 1905	0.393 0085	245
8	0.226 6084	0.218 3591	1828	0.907 8192	0.909 5767	355	0.393 7988	0.394 5615	233
9	0.210 0942	0.201 8141	1843	0.911 2701	0.912 8994	329	0.395 2965	0.396 0036	221
10	0.193 5194	0.185 2106	1858	0.914 4645	0.915 9654	302	0.396 6827	0.397 3339	209
11	+0.176 8884	+0.168 5532	+1873	+0.917 4018	+0.918 7735	-275	+0.397 9572	+0.398 5524	-197
12	0.160 2057	0.151 8464	1887	0.920 0803	0.921 3221	248	0.399 1194	0.399 6582	185
13	0.143 4760	0.135 0951	1901	0.922 4989	0.923 6106	221	0.400 1687	0.400 6508	173
14	0.126 7042	0.118 3040	1914	0.924 6571	0.925 6382	193	0.401 1046	0.401 5301	160
15	0.109 8950	0.101 4779	1927	0.926 5538	0.927 4038	165	0.401 9272	0.402 2957	147
16	+0.093 0534	+0.084 6220	+1939	+0.928 1881	+0.928 9068	-136	+0.402 6357	+0.402 9471	-134
17	0.076 1844	0.067 7413	1950	0.929 5596	0.930 1465	107	0.403 2299	0.403 4842	121
18	0.059 2932	0.050 8408	1961	0.930 6675	0.931 1226	78	0.403 7099	0.403 9069	108
19	0.042 3848	0.033 9257	1972	0.931 5116	0.931 8345	49	0.404 0753	0.404 2150	95
20	0.025 4643	0.017 0011	1982	0.932 0914	0.932 2824	- 19	0.404 3260	0.404 4085	81
21	+0.008 5369	+0.000 0722	+1991	+0.932 4073	+0.932 4661	+ 11	+0.404 4623	+0.404 4875	- 68
22	-0.008 3922	-0.016 8559	2000	0.932 4589	0.932 3857	41	0.404 4840	0.404 4519	54
23	0.025 3181	0.033 7783	2009	0.932 2466	0.932 0416	72	0.404 3912	0.404 3020	40
24	0.042 2359	0.050 6902	2017	0.931 7708	0.931 4341	103	0.404 1842	0.404 0380	26
25	0.059 1406	0.067 5865	2024	0.931 0316	0.930 5633	134	0.403 8633	0.403 6600	- 12
26	-0.076 0272	-0.084 4622	+2031	+0.930 0295	+0.929 4302	+165	+0.403 4283	+0.403 1682	+ 2
27	0.092 8909	0.101 3127	2037	0.928 7655	0.928 0353	197	0.402 8798	0.402 5631	16
28	0.109 7269	0.118 1331	2042	0.927 2398	0.926 3791	229	0.402 2180	0.401 8446	30
29	0.126 5306	0.134 9188	2047	0.925 4533	0.924 4625	261	0.401 4431	0.401 0134	44
30	0.143 2972	0.151 6652	2051	0.923 4069	0.922 2864	293	0.400 5556	0.400 0697	59
July 1	-0.160 0222	-0.168 3677	+2055	+0.921 1012	+0.919 8514	+325	+0.399 5559	+0.399 0141	+ 73
2	-0.176 7011	-0.185 0219	+2058	+0.918 5373	+0.917 1589	+358	+0.398 4443	+0.397 8467	+ 88

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
uly 1	-0.160 0222	-0.168 3677	+2055	+0.921 1012	+0.919 8514	+ 325	+0.399 5559	+0.399 0141	+ 73
2	0.176 7011	0.185 0219	2058	0.918 5373	0.917 1589	358	0.398 4443	0.397 8467	88
3	0.193 3296	0.201 6237	2060	0.915 7164	0.914 2098	391	0.397 2214	0.396 5682	102
4	0.209 9035	0.218 1686	2062	0.912 6392	0.911 0049	424	0.395 8871	0.395 1784	117
5	0.226 4184	0.234 6525	2063	0.909 3069	0.907 5451	457	0.394 4422	0.393 6784	131
6	-0.242 8703	-0.251 0713	+2063	+0.905 7197	+0.903 8309	+ 490	+0.392 8871	+0.392 0681	+146
7	0.259 2549	0.267 4206	2062	0.901 8789	0.899 8637	523	0.391 2216	0.390 3477	160
8	0.275 5678	0.283 6961	2061	0.897 7854	0.895 6440	557	0.389 4464	0.388 5178	175
9	0.291 8049	0.299 8936	2059	0.893 4397	0.891 1727	590	0.387 5618	0.386 5785	190
10	0.307 9616	0.316 0083	2057	0.888 8429	0.886 4504	624	0.385 5680	0.384 5302	205
11	-0.324 0332	-0.332 0357	+2054	+0.883 9955	+0.881 4783	+ 657	+0.383 4653	+0.382 3733	+220
12	0.340 0151	0.347 9709	2050	0.878 8989	0.876 2575	691	0.381 2543	0.380 1084	235
13	0.355 9026	0.363 8096	2045	0.873 5541	0.870 7888	725	0.378 9355	0.377 7357	250
14	0.371 6912	0.379 5469	2040	0.867 9618	0.865 0734	759	0.376 5091	0.375 2559	265
15	0.387 3759	0.395 1778	2034	0.862 1238	0.859 1130	793	0.373 9762	0.372 6700	280
16	-0.402 9519	-0.410 6977	+2027	+0.856 0414	+0.852 9092	+ 827	+0.371 3373	+0.369 9782	+295
17	0.418 4145	0.426 1018	2020	0.849 7166	0.846 4637	861	0.368 5929	0.367 1815	310
18	0.433 7589	0.441 3853	2012	0.843 1509	0.839 7782	894	0.365 7441	0.364 2807	325
19	0.448 9805	0.456 5439	2003	0.836 3459	0.832 8545	928	0.362 7915	0.361 2767	340
20	0.464 0749	0.471 5729	1993	0.829 3041	0.825 6949	962	0.359 7363	0.358 1704	355
21	-0.479 0373	-0.486 4676	+1983	+0.822 0272	+0.818 3014	+ 996	+0.356 5792	+0.354 9628	+370
22	0.493 8633	0.501 2238	1972	0.814 5177	0.810 6763	1029	0.353 3213	0.351 6548	384
23	0.508 5487	0.515 8374	1960	0.806 7776	0.802 8219	1063	0.349 9635	0.348 2474	399
24	0.523 0892	0.530 3036	1947	0.798 8095	0.794 7406	1096	0.346 5068	0.344 7418	414
25	0.537 4802	0.544 6186	1934	0.790 6158	0.786 4353	1129	0.342 9525	0.341 1390	429
26	-0.551 7181	-0.558 7783	+1920	+0.782 1994	+0.777 9082	+1162	+0.339 3016	+0.337 4403	+443
27	0.565 7987	0.572 7787	1905	0.773 5622	0.769 1616	1195	0.335 5553	0.333 6466	458
28	0.579 7179	0.586 6159	1889	0.764 7069	0.760 1985	1227	0.331 7144	0.329 7590	472
29	0.593 4723	0.600 2865	1873	0.755 6367	0.751 0218	1260	0.327 7805	0.325 7790	487
30	0.607 0580	0.613 7864	1856	0.746 3541	0.741 6341	1292	0.323 7546	0.321 7075	501
31	-0.620 4714	-0.627 1126	+1838	+0.736 8620	+0.732 0381	+1324	+0.319 6378	+0.317 5457	+516
Aug. 1	0.633 7094	0.640 2615	1820	0.727 1628	0.722 2365	1356	0.315 4312	0.313 2946	530
2	0.646 7684	0.653 2297	1801	0.717 2594	0.712 2318	1388	0.311 1360	0.308 9555	544
3	0.659 6450	0.666 0140	1781	0.707 1542	0.702 0269	1419	0.306 7533	0.304 5294	558
4	0.672 3361	0.678 6110	1760	0.696 8501	0.691 6240	1450	0.302 2840	0.300 0173	572
5	-0.684 8381	-0.691 0171	+1739	+0.686 3491	+0.681 0257	+1481	+0.297 7294	+0.295 4204	+586
6	0.697 1476	0.703 2291	1717	0.675 6542	0.670 2347	1512	0.293 0904	0.290 7396	600
7	0.709 2611	0.715 2433	1694	0.664 7676	0.659 2533	1542	0.288 3681	0.285 9760	613
8	0.721 1752	0.727 0561	1671	0.653 6920	0.648 0841	1572	0.283 5636	0.281 1309	627
9	0.732 8858	0.738 6638	1647	0.642 4300	0.636 7300	1601	0.278 6781	0.276 2053	640
10	-0.744 3897	-0.750 0628	+1622	+0.630 9844	+0.625 1938	+1630	+0.273 7127	+0.271 2006	+654
11	0.755 6828	0.761 2491	1597	0.619 3584	0.613 4785	1659	0.268 6691	0.266 1182	667
12	0.766 7614	0.772 2192	1571	0.607 5547	0.601 5873	1687	0.263 5482	0.260 9593	680
13	0.777 6221	0.782 9697	1544	0.595 5768	0.589 5237	1715	0.258 3517	0.255 7256	693
14	0.788 2615	0.793 4970	1516	0.583 4282	0.577 2907	1743	0.253 0812	0.250 4186	706
15	-0.798 6759	-0.803 7976	+1488	+0.571 1118	+0.564 8919	+1770	+0.247 7381	+0.245 0397	+718
16	-0.808 8619	-0.813 8684	+1459	+0.558 6315	+0.552 3309	+1797	+0.242 3236	+0.239 5902	+730

## GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1917.0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Aug. 16	-0.808 8619	-0.813 8684	+1459	+0.558 6315	+0.552 3309	+1797	+0.242 3236	+0.239 5902	+ 730
17	0.818 8164	0.823 7057	1430	0.545 9908	0.539 6115	1823	0.236 8397	0.234 0722	742
18	0.828 5360	0.833 3069	1400	0.533 1936	0.526 7374	1849	0.231 2880	0.228 4872	754
19	0.838 0179	0.842 6686	1369	0.520 2434	0.513 7123	1874	0.225 6700	0.222 8368	766
20	0.847 2588	0.851 7882	1338	0.507 1444	0.500 5401	1899	0.219 9878	0.217 1230	778
21	-0.856 2563	-0.860 6628	+1306	+0.493 9001	+0.487 2248	+1923	+0.214 2425	+0.211 3468	+ 789
22	0.865 0074	0.869 2898	1274	0.480 5147	0.473 7704	1946	0.208 4362	0.205 5108	801
23	0.873 5096	0.877 6665	1241	0.466 9923	0.460 1810	1969	0.202 5707	0.199 6162	812
24	0.881 7602	0.885 7905	1208	0.453 3369	0.446 4606	1991	0.196 6475	0.193 6649	823
25	0.889 7571	0.893 6597	1174	0.439 5526	0.432 6133	2013	0.190 6686	0.187 6587	833
26	-0.897 4980	-0.901 2717	+1139	+0.425 6434	+0.418 6433	+2035	+0.184 6356	+0.181 5994	+ 844
27	0.904 9806	0.908 6246	1104	0.411 6136	0.404 5547	2056	0.178 5504	0.175 4888	854
28	0.912 2034	0.915 7168	1068	0.397 4672	0.390 3515	2077	0.172 4147	0.169 3284	864
29	0.919 1645	0.922 5462	1032	0.383 2082	0.376 0377	2097	0.166 2300	0.163 1199	874
30	0.925 8619	0.929 1113	996	0.368 8406	0.361 6173	2116	0.159 9982	0.156 8651	884
31	-0.932 2940	-0.935 4099	+ 959	+0.354 3682	+0.347 0938	+2135	+0.153 7209	+0.150 5657	+ 893
Sept. 1	0.938 4589	0.941 4408	921	0.339 7947	0.332 4713	2153	0.147 3996	0.144 2230	902
2	0.944 3554	0.947 2024	883	0.325 1241	0.317 7536	2171	0.141 0360	0.137 8388	911
3	0.949 9815	0.952 6924	845	0.310 3601	0.302 9441	2188	0.134 6317	0.131 4148	920
4	0.955 3350	0.957 9091	806	0.295 5062	0.288 0468	2204	0.128 1883	0.124 9524	929
5	-0.960 4144	-0.962 8508	+ 767	+0.280 5665	+0.273 0656	+2219	+0.121 7074	+0.118 4535	+ 937
6	0.965 2180	0.967 5156	727	0.265 5447	0.258 0044	2234	0.115 1908	0.111 9196	945
7	0.969 7433	0.971 9010	687	0.250 4451	0.242 8673	2248	0.108 6403	0.105 3529	953
8	0.973 9884	0.976 0054	647	0.235 2715	0.227 6584	2262	0.102 0577	0.098 7550	960
9	0.977 9518	0.979 8274	606	0.220 0285	0.212 3822	2275	0.095 4449	0.092 1276	967
10	-0.981 6320	-0.983 3653	+ 565	+0.204 7201	+0.197 0428	+2287	+0.088 8036	+0.085 4730	+ 974
11	0.985 0271	0.986 6173	524	0.189 3510	0.181 6452	2299	0.082 1361	0.078 7931	981
12	0.988 1357	0.989 5820	482	0.173 9259	0.166 1936	2310	0.075 4442	0.072 0898	987
13	0.990 9561	0.992 2579	440	0.158 4489	0.150 6925	2320	0.068 7300	0.065 3651	993
14	0.993 4873	0.994 6441	398	0.142 9250	0.135 1469	2330	0.061 9954	0.058 6212	999
15	-0.995 7281	-0.996 7392	+ 355	+0.127 3587	+0.119 5612	+2339	+0.055 2427	+0.051 8602	+1004
16	0.997 6774	0.998 5426	312	0.111 7550	0.103 9405	2348	0.048 4739	0.045 0840	1009
17	0.999 3347	1.000 0534	269	0.096 1184	0.088 2894	2355	0.041 6908	0.038 2947	1014
18	1.000 6988	1.001 2709	226	0.080 4540	0.072 6128	2362	0.034 8958	0.031 4944	1019
19	1.001 7695	1.002 1945	182	0.064 7664	0.056 9153	2368	0.028 0909	0.024 6854	1023
20	-1.002 5460	-1.002 8240	+ 138	+0.049 0603	+0.041 2020	+2374	+0.021 2783	+0.017 8698	+1027
21	1.003 0285	1.003 1593	94	0.033 3410	0.025 4779	2379	0.014 4600	0.011 0492	1031
22	1.003 2164	1.003 1999	50	0.017 6132	+0.009 7475	2383	0.007 6379	+0.004 2262	1034
23	1.003 1099	1.002 9463	+ 6	+0.001 8814	-0.005 9845	2387	+0.000 8144	-0.002 5973	1037
24	1.002 7090	1.002 3982	- 39	-0.013 8495	0.021 7130	2390	-0.006 0086	0.009 4194	1040
25	-1.002 0138	-1.001 5560	- 84	-0.029 5746	-0.037 4337	+2392	-0.012 8293	-0.016 2381	+1042
26	1.001 0249	1.000 4205	129	0.045 2896	0.053 1418	2393	0.019 6456	0.023 0515	1044
27	0.999 7430	0.998 9922	174	0.060 9898	0.068 8331	2394	0.026 4555	0.029 8575	1046
28	0.998 1681	0.997 2710	219	0.076 6710	0.084 5030	2394	0.033 2572	0.036 6545	1047
29	0.996 3011	0.995 2582	264	0.092 3287	0.100 1475	2393	0.040 0490	0.043 4406	1049
30	-0.994 1423	-0.992 9534	- 309	-0.107 9588	-0.115 7621	+2392	-0.046 8290	-0.050 2139	+1050
Oct. 1	-0.991 6918	-0.990 3575	- 354	-0.123 5569	-0.131 3427	+2390	-0.053 5952	-0.056 9727	+1050



GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Oct. 1	-0.991 6918	-0.990 3575	- 354	-0.123 5569	-0.131 3427	+2390	-0.053 5952	-0.056 9727	+1050
2	0.988 9505	0.987 4707	400	0.139 1189	0.146 8850	2387	0.060 3460	0.063 7150	1050
3	0.985 9184	0.984 2935	445	0.154 6406	0.162 3851	2383	0.067 0794	0.070 4390	1050
4	0.982 5960	0.980 8261	491	0.170 1178	0.177 8383	2379	0.073 7936	0.077 1429	1049
5	0.978 9839	0.977 0692	537	0.185 5459	0.193 2402	2374	0.080 4866	0.083 8245	1048
6	-0.975 0822	-0.973 0228	- 582	-0.200 9206	-0.208 5865	+2368	-0.087 1565	-0.090 4822	+1046
7	0.970 8913	0.968 6878	628	0.216 2372	0.223 8722	2362	0.093 8012	0.097 1135	1045
8	0.966 4124	0.964 0650	673	0.231 4909	0.239 0928	2355	0.100 4188	0.103 7167	1043
9	0.961 6458	0.959 1550	718	0.246 6773	0.254 2438	2347	0.107 0069	0.110 2894	1041
10	0.956 5926	0.953 9587	763	0.261 7916	0.269 3202	2339	0.113 5638	0.116 8298	1038
11	-0.951 2536	-0.948 4774	- 808	-0.276 8290	-0.284 3174	+2330	-0.120 0872	-0.123 3358	+1035
12	0.945 6302	0.942 7121	854	0.291 7848	0.299 2305	2320	0.126 5751	0.129 8050	1032
13	0.939 7235	0.936 6644	899	0.306 6540	0.314 0548	2309	0.133 0253	0.136 2357	1028
14	0.933 5352	0.930 3359	944	0.321 4322	0.328 7855	2298	0.139 4359	0.142 6256	1024
15	0.927 0668	0.923 7280	989	0.336 1143	0.343 4180	2286	0.145 8046	0.148 9728	1020
16	-0.920 3198	-0.916 8426	-1034	-0.350 6959	-0.357 9475	+2274	-0.152 1297	-0.155 2751	+1015
17	0.913 2965	0.909 6817	1079	0.365 1721	0.372 3691	2261	0.158 4087	0.161 5304	1010
18	0.905 9985	0.902 2473	1124	0.379 5380	0.386 6782	2247	0.164 6399	0.167 7370	1004
19	0.898 4283	0.894 5417	1169	0.393 7891	0.400 8702	2232	0.170 8212	0.173 8925	998
20	0.890 5880	0.886 5673	1213	0.407 9209	0.414 9407	2217	0.176 9506	0.179 9952	992
21	-0.882 4800	-0.878 3265	-1257	-0.421 9289	-0.428 8851	+2201	-0.183 0262	-0.186 0434	+ 985
22	0.874 1072	0.869 8223	1301	0.435 8087	0.442 6991	2185	0.189 0464	0.192 0350	978
23	0.865 4722	0.861 0573	1345	0.449 5559	0.456 3785	2168	0.195 0089	0.197 9681	971
24	0.856 5778	0.852 0340	1389	0.463 1665	0.469 9194	2150	0.200 9122	0.203 8412	963
25	0.847 4265	0.842 7556	1432	0.476 6366	0.483 3177	2131	0.206 7548	0.209 6527	955
26	-0.838 0215	-0.833 2246	-1475	-0.489 9621	-0.496 5695	+2111	-0.212 5348	-0.215 4007	+ 947
27	0.828 3654	0.823 4441	1518	0.503 1392	0.509 6709	2091	0.218 2504	0.221 0837	939
28	0.818 4610	0.813 4166	1561	0.516 1642	0.522 6186	2070	0.223 9003	0.226 7002	930
29	0.808 3113	0.803 1452	1603	0.529 0337	0.535 4090	2049	0.229 4830	0.232 2486	921
30	0.797 9187	0.792 6322	1645	0.541 7439	0.548 0380	2027	0.234 9967	0.237 7271	911
31	-0.787 2862	-0.781 8809	-1687	-0.554 2909	-0.560 5023	+2004	-0.240 4397	-0.243 1344	+ 901
Nov. 1	0.776 4166	0.770 8935	1728	0.566 6716	0.572 7983	1981	0.245 8108	0.248 4688	891
2	0.765 3121	0.759 6728	1769	0.578 8820	0.584 9221	1957	0.251 1080	0.253 7283	880
3	0.753 9760	0.748 2219	1810	0.590 9182	0.596 8699	1933	0.256 3295	0.258 9115	869
4	0.742 4109	0.736 5433	1851	0.602 7767	0.608 6380	1908	0.261 4741	0.264 0169	858
5	-0.730 6198	-0.724 6407	-1891	-0.614 4535	-0.620 2226	+1882	-0.266 5398	-0.269 0426	+ 846
6	0.718 6061	0.712 5166	1931	0.625 9449	0.631 6199	1855	0.271 5251	0.273 9869	834
7	0.706 3726	0.700 1746	1971	0.637 2470	0.642 8259	1828	0.276 4280	0.278 8482	821
8	0.693 9229	0.687 6180	2010	0.648 3560	0.653 8369	1800	0.281 2471	0.283 6246	809
9	0.681 2606	0.674 8509	2049	0.659 2681	0.664 6493	1772	0.285 9806	0.288 3149	796
10	-0.668 3894	-0.661 8764	-2087	-0.669 9798	-0.675 2592	+1743	-0.290 6271	-0.292 9172	+ 783
11	0.655 3126	0.648 6984	2125	0.680 4871	0.685 6631	1713	0.295 1848	0.297 4299	769
12	0.642 0344	0.635 3210	2162	0.690 7866	0.695 8572	1682	0.299 6522	0.301 8515	755
13	0.628 5587	0.621 7479	2199	0.700 8745	0.705 8380	1651	0.304 0277	0.306 1805	741
14	0.614 8894	0.607 9836	2236	0.710 7473	0.715 6021	1619	0.308 3097	0.310 4153	726
15	-0.601 0311	-0.594 0324	-2272	-0.720 4020	-0.725 1464	+1587	-0.312 4971	-0.314 5547	+ 711
16	-0.586 9882	-0.579 8989	-2308	-0.729 8350	-0.734 4673	+1554	-0.316 5880	-0.318 5970	+ 696

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Nov. 16	-0.586 9882	-0.579 8989	-2308	-0.729 8350	-0.734 4673	+1554	-0.316 5880	-0.318 5970	+696
17	0.572 7652	0.565 5875	2343	0.739 0429	0.743 5615	1521	0.320 5814	0.322 5410	680
18	0.558 3665	0.551 1028	2378	0.748 0226	0.752 4261	1487	0.324 4758	0.326 3856	664
19	0.543 7969	0.536 4495	2412	0.756 7717	0.761 0588	1452	0.328 2702	0.330 1294	648
20	0.529 0611	0.521 6325	2445	0.765 2871	0.769 4563	1416	0.331 9631	0.333 7713	632
21	-0.514 1641	-0.506 6566	-2478	-0.773 5662	-0.777 6165	+1380	-0.335 5538	-0.337 3105	+615
22	0.499 1105	0.491 5265	2510	0.781 6068	0.785 5369	1343	0.339 0412	0.340 7458	598
23	0.483 9051	0.476 2469	2542	0.789 4065	0.793 2153	1306	0.342 4242	0.344 0762	581
24	0.468 5526	0.460 8226	2573	0.796 9631	0.800 6495	1268	0.345 7018	0.347 3009	564
25	0.453 0575	0.445 2580	2604	0.804 2742	0.807 8372	1230	0.348 8733	0.350 4189	546
26	-0.437 4246	-0.429 5578	-2634	-0.811 3382	-0.814 7769	+1191	-0.351 9376	-0.353 4294	+528
27	0.421 6583	0.413 7267	2664	0.818 1530	0.821 4664	1152	0.354 8941	0.356 3316	510
28	0.405 7635	0.397 7692	2693	0.824 7169	0.827 9042	1112	0.357 7418	0.359 1245	491
29	0.389 7442	0.381 6892	2721	0.831 0279	0.834 0878	1071	0.360 4797	0.361 8074	472
30	0.373 6049	0.365 4918	2748	0.837 0836	0.840 0153	1030	0.363 1073	0.364 3793	453
Dec. 1	-0.357 3505	-0.349 1816	-2775	-0.842 8826	-0.845 6851	+ 983	-0.365 6233	-0.366 8392	+434
2	0.340 9854	0.332 7626	2801	0.848 4226	0.851 0949	946	0.368 0269	0.369 1863	415
3	0.324 5140	0.316 2402	2826	0.853 7018	0.856 2430	903	0.370 3173	0.371 4199	395
4	0.307 9416	0.299 6188	2851	0.858 7183	0.861 1273	860	0.372 4938	0.373 5389	375
5	0.291 2725	0.282 9034	2875	0.863 4699	0.865 7460	816	0.374 5552	0.375 5426	355
6	-0.274 5122	-0.266 0994	-2898	-0.867 9552	-0.870 0974	+ 771	-0.376 5010	-0.377 4302	+335
7	0.257 6656	0.249 2114	2921	0.872 1723	0.874 1796	726	0.378 3302	0.379 2009	315
8	0.240 7376	0.232 2448	2942	0.876 1193	0.877 9911	681	0.380 0422	0.380 8541	294
9	0.223 7336	0.215 2047	2963	0.879 7949	0.881 5305	635	0.381 6364	0.382 3890	273
10	0.206 6588	0.198 0965	2983	0.883 1976	0.884 7961	589	0.383 1119	0.383 8051	252
11	-0.189 5186	-0.180 9257	-3002	-0.886 3258	-0.887 7864	+ 542	-0.384 4684	-0.385 1017	+231
12	0.172 3185	0.163 6977	3020	0.889 1779	0.890 5002	495	0.385 7050	0.386 2783	210
13	0.155 0640	0.146 4181	3037	0.891 7531	0.892 9365	447	0.386 8214	0.387 3343	183
14	0.137 7608	0.129 0928	3053	0.894 0503	0.895 0944	399	0.387 8170	0.388 2694	166
15	0.120 4148	0.111 7274	3069	0.896 0687	0.896 9729	350	0.388 6915	0.389 0233	144
16	-0.103 0314	-0.094 3277	-3084	-0.897 8070	-0.898 5710	+ 301	-0.389 4448	-0.389 7758	+122
17	0.085 6168	0.076 8995	3098	0.899 2648	0.899 8884	252	0.390 0764	0.390 3467	100
18	0.068 1766	0.059 4488	3111	0.900 4419	0.900 9252	202	0.390 5865	0.390 7958	78
19	0.050 7167	0.041 9810	3123	0.901 3383	0.901 6811	152	0.390 9747	0.391 1232	55
20	0.033 2425	0.024 5018	3134	0.901 9536	0.902 1560	101	0.391 2413	0.391 3290	33
21	-0.015 7597	-0.007 0168	-3144	-0.902 2882	-0.902 3504	+ 50	-0.391 3863	-0.391 4133	+ 10
22	+0.001 7263	+0.010 4688	3153	0.902 3424	0.902 2643	- 1	0.391 4099	0.391 3761	- 12
23	0.019 2101	0.027 9495	3161	0.902 1162	0.901 8983	52	0.391 3119	0.391 2175	35
24	0.036 6864	0.045 4202	3168	0.901 6104	0.901 2525	104	0.391 0928	0.390 9378	58
25	0.054 1501	0.062 8756	3174	0.900 8249	0.900 3274	156	0.390 7525	0.390 5370	81
26	+0.071 5960	+0.080 3106	-3179	-0.899 7602	-0.899 1234	- 208	-0.390 2913	-0.390 0154	-104
27	0.089 0189	0.097 7203	3183	0.898 4170	0.897 6410	260	0.389 7093	0.389 3730	127
28	0.106 4141	0.115 0997	3186	0.896 7956	0.895 8809	313	0.389 0065	0.388 6100	150
29	0.123 7764	0.132 4436	3188	0.894 8969	0.893 8434	366	0.388 1835	0.387 7269	173
30	0.141 1006	0.149 7469	3190	0.892 7205	0.891 5286	419	0.387 2403	0.386 7236	196
31	+0.158 3817	+0.167 0045	-3189	-0.890 2678	-0.888 9379	- 472	-0.386 1769	-0.385 6002	-220
32	+0.175 6146	+0.184 2114	-3188	-0.887 5389	-0.886 0710	- 526	-0.384 9935	-0.384 3570	-243

**MOON, 1917.**

**MEAN TIME.**

**MEAN TIME.**





## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 13.					JANUARY 15.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 11 56.01	1.8021	+ 0 13 26.9	-13.014	0	12 40 43.09	1.9257	-10 6 24.1	-12.520
1	11 13 44.16	1.8030	+ 0 0 25.8	13.021	1	12 42 38.76	1.9301	10 18 54.4	12.490
2	11 15 32.37	1.8039	- 0 12 35.6	13.027	2	12 44 34.70	1.9346	10 31 22.9	12.458
3	11 17 20.63	1.8049	0 25 37.4	13.033	3	12 46 30.91	1.9392	10 43 49.4	12.426
4	11 19 8.96	1.8060	0 38 39.5	13.037	4	12 48 27.40	1.9438	10 56 14.0	12.393
5	11 20 57.35	1.8072	0 51 41.8	13.041	5	12 50 24.16	1.9484	11 8 36.6	12.359
6	11 22 45.82	1.8083	1 4 44.4	13.045	6	12 52 21.21	1.9533	11 20 57.1	12.324
7	11 24 34.35	1.8096	1 17 47.2	13.048	7	12 54 18.55	1.9582	11 33 15.5	12.288
8	11 26 22.97	1.8110	1 30 50.1	13.049	8	12 56 16.19	1.9631	11 45 31.7	12.252
9	11 28 11.67	1.8124	1 43 53.1	13.051	9	12 58 14.12	1.9680	11 57 45.7	12.214
10	11 30 0.46	1.8140	1 56 56.2	13.052	10	13 0 12.35	1.9732	12 9 57.4	12.174
11	11 31 49.35	1.8155	2 9 59.3	13.051	11	13 2 10.90	1.9783	12 22 6.6	12.133
12	11 33 38.32	1.8171	2 23 2.3	13.050	12	13 4 9.75	1.9835	12 34 13.4	12.093
13	11 35 27.40	1.8188	2 36 5.3	13.049	13	13 6 8.92	1.9888	12 46 17.8	12.051
14	11 37 16.58	1.8207	2 49 8.2	13.048	14	13 8 8.41	1.9943	12 58 19.5	12.008
15	11 39 5.88	1.8226	3 2 11.0	13.045	15	13 10 8.23	1.9997	13 10 18.7	11.964
16	11 40 55.29	1.8244	3 15 13.6	13.041	16	13 12 8.37	2.0052	13 22 15.2	11.918
17	11 42 44.81	1.8264	3 28 15.9	13.037	17	13 14 8.85	2.0108	13 34 8.9	11.872
18	11 44 34.46	1.8286	3 41 18.0	13.032	18	13 16 9.67	2.0164	13 45 59.8	11.824
19	11 46 24.24	1.8308	3 54 19.7	13.026	19	13 18 10.82	2.0222	13 57 47.8	11.776
20	11 48 14.15	1.8329	4 7 21.1	13.019	20	13 20 12.33	2.0280	14 9 32.9	11.727
21	11 50 4.19	1.8353	4 20 22.0	13.012	21	13 22 14.18	2.0338	14 21 15.0	11.676
22	11 51 54.38	1.8376	4 33 22.5	13.004	22	13 24 16.39	2.0398	14 32 54.0	11.623
23	11 53 44.70	1.8400	- 4 46 22.5	-12.996	23	13 26 18.95	2.0458	-14 44 29.8	-11.570
JANUARY 14.					JANUARY 16.				
0	11 55 35.18	1.8426	- 4 59 22.0	-12.987	0	13 28 21.88	2.0519	-14 56 2.4	-11.516
1	11 57 25.81	1.8452	5 12 20.9	12.976	1	13 30 25.18	2.0581	15 7 31.7	11.461
2	11 59 16.60	1.8478	5 25 19.1	12.965	2	13 32 28.85	2.0643	15 18 57.7	11.404
3	12 1 7.55	1.8506	5 38 16.7	12.953	3	13 34 32.89	2.0705	15 30 20.2	11.346
4	12 2 58.67	1.8534	5 51 13.5	12.941	4	13 36 37.31	2.0769	15 41 39.2	11.287
5	12 4 49.96	1.8563	6 4 9.6	12.928	5	13 38 42.12	2.0833	15 52 54.6	11.227
6	12 6 41.42	1.8593	6 17 4.9	12.914	6	13 40 47.31	2.0898	16 4 6.4	11.165
7	12 8 33.07	1.8623	6 29 59.3	12.898	7	13 42 52.89	2.0963	16 15 14.4	11.103
8	12 10 24.90	1.8655	6 42 52.7	12.883	8	13 44 58.87	2.1030	16 26 18.7	11.039
9	12 12 16.93	1.8687	6 55 45.3	12.868	9	13 47 5.25	2.1096	16 37 19.1	10.973
10	12 14 9.14	1.8719	7 8 36.8	12.849	10	13 49 12.02	2.1163	16 48 15.5	10.907
11	12 16 1.56	1.8753	7 21 27.2	12.832	11	13 51 19.20	2.1231	16 59 7.9	10.839
12	12 17 54.18	1.8788	7 34 16.6	12.813	12	13 53 26.79	2.1299	17 9 56.2	10.770
13	12 19 47.01	1.8822	7 47 4.8	12.793	13	13 55 34.79	2.1368	17 20 40.3	10.699
14	12 21 40.04	1.8858	7 59 51.8	12.773	14	13 57 43.21	2.1438	17 31 20.1	10.628
15	12 23 33.30	1.8894	8 12 37.5	12.752	15	13 59 52.04	2.1508	17 41 55.6	10.554
16	12 25 26.77	1.8932	8 25 22.0	12.729	16	14 2 1.30	2.1578	17 52 26.6	10.479
17	12 27 20.48	1.8970	8 38 5.0	12.706	17	14 4 10.98	2.1649	18 2 53.1	10.403
18	12 29 14.41	1.9008	8 50 46.7	12.683	18	14 6 21.09	2.1721	18 13 15.0	10.327
19	12 31 8.57	1.9048	9 3 26.9	12.658	19	14 8 31.63	2.1793	18 23 32.3	10.248
20	12 33 2.98	1.9088	9 16 5.6	12.632	20	14 10 42.61	2.1866	18 33 44.7	10.168
21	12 34 57.63	1.9129	9 28 42.7	12.605	21	14 12 54.02	2.1938	18 43 52.4	10.087
22	12 36 52.53	1.9171	9 41 18.2	12.578	22	14 15 5.87	2.2012	18 53 55.1	10.003
23	12 38 47.68	1.9213	9 53 52.0	12.549	23	14 17 18.16	2.2086	19 3 52.8	9.919
24	12 40 43.09	1.9257	- 10 6 24.1	-12.520	24	14 19 30.90	2.2160	-19 13 45.4	-9.833



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 21.					JANUARY 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 23 11.56	2.7189	-24 40 58.4	+ 4.829	0	20 30 2.67	2.5274	-17 30 59.1	+12.530
1	18 25 54.67	2.7178	24 36 3.0	5.017	1	20 32 34.14	2.5215	17 18 23.7	12.649
2	18 28 37.70	2.7166	24 30 56.4	5.204	2	20 35 5.25	2.5157	17 5 41.2	12.766
3	18 31 20.66	2.7153	24 25 38.5	5.392	3	20 37 36.02	2.5098	16 52 51.8	12.880
4	18 34 3.54	2.7138	24 20 9.4	5.578	4	20 40 6.43	2.5039	16 39 55.6	12.993
5	18 36 46.31	2.7120	24 14 29.2	5.763	5	20 42 36.49	2.4981	16 26 52.7	13.103
6	18 39 28.98	2.7102	24 8 37.9	5.947	6	20 45 6.20	2.4923	16 13 43.2	13.212
7	18 42 11.53	2.7082	24 2 35.6	6.131	7	20 47 35.56	2.4863	16 0 27.3	13.318
8	18 44 53.96	2.7060	23 56 22.2	6.314	8	20 50 4.56	2.4804	15 47 5.1	13.422
9	18 47 36.25	2.7037	23 49 57.9	6.496	9	20 52 33.21	2.4746	15 33 36.7	13.524
10	18 50 18.40	2.7013	23 43 22.7	6.678	10	20 55 1.51	2.4688	15 20 2.2	13.624
11	18 53 0.40	2.6987	23 36 36.6	6.858	11	20 57 29.46	2.4628	15 6 21.8	13.722
12	18 55 42.24	2.6959	23 29 39.7	7.038	12	20 59 57.05	2.4569	14 52 35.6	13.818
13	18 58 23.91	2.6929	23 22 32.1	7.216	13	21 2 24.29	2.4511	14 38 43.7	13.911
14	19 1 5.39	2.6899	23 15 13.8	7.394	14	21 4 51.18	2.4453	14 24 46.3	14.002
15	19 3 46.70	2.6868	23 7 44.8	7.570	15	21 7 17.73	2.4395	14 10 43.5	14.091
16	19 6 27.80	2.6834	23 0 5.4	7.745	16	21 9 43.92	2.4337	13 56 35.4	14.178
17	19 9 8.71	2.6800	22 52 15.4	7.919	17	21 12 9.77	2.4279	13 42 22.1	14.263
18	19 11 49.40	2.6764	22 44 15.1	8.091	18	21 14 35.27	2.4222	13 28 3.8	14.345
19	19 14 29.88	2.6728	22 36 4.5	8.263	19	21 17 0.43	2.4164	13 13 40.7	14.426
20	19 17 10.14	2.6690	22 27 43.6	8.433	20	21 19 25.24	2.4107	12 59 12.7	14.504
21	19 19 50.16	2.6651	22 19 12.5	8.602	21	21 21 49.71	2.4051	12 44 40.2	14.580
22	19 22 29.95	2.6611	22 10 31.4	8.769	22	21 24 13.85	2.3994	12 30 3.1	14.654
23	19 25 9.49	2.6568	-22 1 40.2	+ 8.935	23	21 26 37.64	2.3938	-12 15 21.7	+14.726
JANUARY 22.					JANUARY 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 27 48.77	2.6526	-21 52 39.2	+ 9.099	0	21 29 1.10	2.3883	-12 0 36.0	+14.796
1	19 30 27.80	2.6483	21 43 28.3	9.262	1	21 31 24.23	2.3828	11 45 46.2	14.863
2	19 33 6.56	2.6438	21 34 7.8	9.423	2	21 33 47.03	2.3773	11 30 52.4	14.928
3	19 35 45.05	2.6393	21 24 37.5	9.583	3	21 36 9.50	2.3718	11 15 54.8	14.991
4	19 38 23.27	2.6346	21 14 57.8	9.741	4	21 38 31.65	2.3664	11 0 53.5	15.053
5	19 41 1.20	2.6298	21 5 8.6	9.898	5	21 40 53.47	2.3610	10 45 48.5	15.112
6	19 43 38.85	2.6251	20 55 10.0	10.053	6	21 43 14.97	2.3558	10 30 40.1	15.168
7	19 46 16.21	2.6202	20 45 2.2	10.206	7	21 45 36.16	2.3505	10 15 28.3	15.223
8	19 48 53.27	2.6152	20 34 45.3	10.358	8	21 47 57.03	2.3453	10 0 13.3	15.277
9	19 51 30.03	2.6101	20 24 19.3	10.508	9	21 50 17.59	2.3401	9 44 55.1	15.327
10	19 54 6.48	2.6049	20 13 44.3	10.657	10	21 52 37.84	2.3350	9 29 34.1	15.375
11	19 56 42.62	2.5998	20 3 0.5	10.803	11	21 54 57.79	2.3299	9 14 10.1	15.422
12	19 59 18.45	2.5945	19 52 8.0	10.947	12	21 57 17.43	2.3249	8 58 43.5	15.466
13	20 1 53.96	2.5892	19 41 6.9	11.089	13	21 59 36.78	2.3200	8 43 14.2	15.509
14	20 4 29.15	2.5838	19 29 57.3	11.230	14	22 1 55.83	2.3151	8 27 42.4	15.549
15	20 7 4.01	2.5783	19 18 39.3	11.369	15	22 4 14.59	2.3103	8 12 8.3	15.587
16	20 9 38.54	2.5728	19 7 13.0	11.506	16	22 6 33.07	2.3056	7 56 32.0	15.623
17	20 12 12.74	2.5673	18 55 38.6	11.641	17	22 8 51.26	2.3008	7 40 53.5	15.658
18	20 14 46.61	2.5617	18 43 56.1	11.773	18	22 11 9.17	2.2962	7 25 13.0	15.690
19	20 17 20.14	2.5560	18 32 5.8	11.904	19	22 13 26.80	2.2916	7 9 30.7	15.720
20	20 19 53.33	2.5503	18 20 7.6	12.034	20	22 15 44.16	2.2871	6 53 46.6	15.748
21	20 22 26.18	2.5447	18 8 1.7	12.162	21	22 18 1.25	2.2827	6 38 0.9	15.774
22	20 24 58.69	2.5389	17 55 48.2	12.287	22	22 20 18.08	2.2783	6 22 13.7	15.798
23	20 27 30.85	2.5332	17 43 27.3	12.409	23	22 22 34.64	2.2739	6 6 25.1	15.821
24	20 30 2.67	2.5274	-17 30 59.1	+12.530	24	22 24 50.95	2.2698	- 5 50 35.2	+15.842

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 25.					JANUARY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 24 50.95	2.2698	-5 50 35.2	+15.842	0	0 10 15.96	2.1505	+ 6 40 21.6	+14.848
1	22 27 7.01	2.2656	5 34 44.1	15.860	1	0 12 24.97	2.1498	6 55 10.8	14.792
2	22 29 22.82	2.2614	5 18 52.0	15.877	2	0 14 33.93	2.1491	7 9 56.6	14.735
3	22 31 38.38	2.2574	5 2 58.9	15.892	3	0 16 42.86	2.1485	7 24 39.0	14.677
4	22 33 53.71	2.2534	4 47 5.0	15.905	4	0 18 51.75	2.1479	7 39 17.8	14.617
5	22 36 8.79	2.2495	4 31 10.3	15.917	5	0 21 0.61	2.1474	7 53 53.0	14.556
6	22 38 23.65	2.2458	4 15 15.0	15.925	6	0 23 9.44	2.1470	8 8 24.5	14.494
7	22 40 38.28	2.2419	3 59 19.3	15.933	7	0 25 18.25	2.1467	8 22 52.3	14.431
8	22 42 52.68	2.2383	3 43 23.1	15.938	8	0 27 27.04	2.1463	8 37 16.2	14.367
9	22 45 6.87	2.2347	3 27 26.7	15.942	9	0 29 35.81	2.1460	8 51 36.3	14.302
10	22 47 20.84	2.2310	3 11 30.1	15.944	10	0 31 44.56	2.1458	9 5 52.4	14.234
11	22 49 34.59	2.2276	2 55 33.4	15.945	11	0 33 53.31	2.1458	9 20 4.4	14.167
12	22 51 48.15	2.2243	2 39 36.7	15.943	12	0 36 2.05	2.1457	9 34 12.4	14.098
13	22 54 1.50	2.2209	2 23 40.2	15.940	13	0 38 10.79	2.1458	9 48 16.2	14.028
14	22 56 14.66	2.2177	2 7 43.9	15.935	14	0 40 19.54	2.1458	10 2 15.8	13.958
15	22 58 27.62	2.2144	1 51 48.0	15.928	15	0 42 28.28	2.1458	10 16 11.1	13.886
16	23 0 40.39	2.2113	1 35 52.6	15.920	16	0 44 37.04	2.1461	10 30 2.1	13.813
17	23 2 52.98	2.2083	1 19 57.6	15.910	17	0 46 45.81	2.1463	10 43 48.7	13.739
18	23 5 5.39	2.2054	1 4 3.4	15.898	18	0 48 54.59	2.1465	10 57 30.8	13.663
19	23 7 17.63	2.2025	0 48 9.8	15.886	19	0 51 3.39	2.1468	11 11 8.3	13.588
20	23 9 29.69	2.1997	0 32 17.1	15.870	20	0 53 12.21	2.1472	11 24 41.3	13.511
21	23 11 41.59	2.1969	0 16 25.4	15.853	21	0 55 21.05	2.1476	11 38 9.6	13.433
22	23 13 53.32	2.1943	-0 0 34.7	15.836	22	0 57 29.92	2.1481	11 51 33.3	13.354
23	23 16 4.90	2.1917	+0 15 14.9	+15.816	23	0 59 38.82	2.1486	+12 4 52.1	+13.274
JANUARY 26.					JANUARY 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 18 16.32	2.1891	+0 31 3.2	+15.794	0	1 1 47.75	2.1492	+12 18 6.2	+13.193
1	23 20 27.59	2.1867	0 46 50.2	15.772	1	1 3 56.72	2.1498	12 31 15.3	13.111
2	23 22 38.72	2.1844	1 2 35.8	15.747	2	1 6 5.72	2.1504	12 44 19.5	13.028
3	23 24 49.72	2.1821	1 18 19.8	15.721	3	1 8 14.77	2.1512	12 57 18.7	12.945
4	23 27 0.57	2.1798	1 34 2.3	15.693	4	1 10 23.86	2.1519	13 10 12.9	12.860
5	23 29 11.29	2.1777	1 49 43.0	15.664	5	1 12 33.00	2.1528	13 23 1.9	12.774
6	23 31 21.89	2.1757	2 5 22.0	15.634	6	1 14 42.19	2.1535	13 35 45.8	12.688
7	23 33 32.37	2.1737	2 20 59.1	15.603	7	1 16 51.42	2.1544	13 48 24.5	12.601
8	23 35 42.73	2.1718	2 36 34.3	15.569	8	1 19 0.72	2.1554	14 0 57.9	12.512
9	23 37 52.98	2.1698	2 52 7.4	15.534	9	1 21 10.07	2.1563	14 13 25.9	12.423
10	23 40 3.11	2.1680	3 7 38.4	15.498	10	1 23 19.48	2.1573	14 25 48.6	12.333
11	23 42 13.14	2.1663	3 23 7.1	15.459	11	1 25 28.94	2.1583	14 38 5.9	12.243
12	23 44 23.07	2.1648	3 38 33.5	15.421	12	1 27 38.48	2.1595	14 50 17.7	12.150
13	23 46 32.91	2.1632	3 53 57.6	15.380	13	1 29 48.08	2.1606	15 2 23.9	12.058
14	23 48 42.65	2.1617	4 9 19.1	15.338	14	1 31 57.75	2.1617	15 14 24.6	11.964
15	23 50 52.31	2.1603	4 24 38.2	15.296	15	1 34 7.48	2.1628	15 26 19.6	11.870
16	23 53 1.88	2.1588	4 39 54.6	15.251	16	1 36 17.29	2.1642	15 38 9.0	11.775
17	23 55 11.37	2.1576	4 55 8.3	15.205	17	1 38 27.18	2.1653	15 49 52.6	11.679
18	23 57 20.79	2.1564	5 10 19.2	15.158	18	1 40 37.13	2.1666	16 1 30.5	11.583
19	23 59 30.14	2.1553	5 25 27.2	15.109	19	1 42 47.17	2.1680	16 13 2.5	11.484
20	0 1 39.42	2.1542	5 40 32.3	15.059	20	1 44 57.29	2.1693	16 24 28.6	11.386
21	0 3 48.64	2.1532	5 55 34.3	15.008	21	1 47 7.48	2.1706	16 35 48.8	11.286
22	0 5 57.80	2.1523	6 10 33.3	14.957	22	1 49 17.76	2.1720	16 47 3.1	11.188
23	0 8 6.91	2.1513	6 25 29.1	14.903	23	1 51 28.12	2.1733	16 58 11.3	11.087
24	0 10 15.96	2.1505	+6 40 21.6	+14.848	24	1 53 38.56	2.1748	+17 9 13.5	+10.986

## MEAN TIME.

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**MEAN TIME.**



**MOON, 1917.**

**MEAN TIME.**

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 14.					FEBRUARY 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 57 28.45	2.2733	-21 37 29.4	-7.942	0	16 53 56.38	2.5597	-25 31 22.7	-1.331
1	14 59 45.05	2.2801	21 45 22.7	7.834	1	16 56 30.09	2.5638	25 32 37.6	1.166
2	15 2 2.06	2.2868	21 53 9.5	7.725	2	16 59 4.04	2.5679	25 33 42.6	1.000
3	15 4 19.47	2.2936	22 0 49.7	7.614	3	17 1 38.24	2.5718	25 34 37.6	0.833
4	15 6 37.28	2.3003	22 8 23.2	7.503	4	17 4 12.66	2.5757	25 35 22.6	0.665
5	15 8 55.50	2.3070	22 15 50.0	7.390	5	17 6 47.32	2.5796	25 35 57.4	0.497
6	15 11 14.12	2.3137	22 23 10.0	7.276	6	17 9 22.20	2.5831	25 36 22.2	0.328
7	15 13 33.14	2.3203	22 30 23.1	7.160	7	17 11 57.29	2.5865	25 36 36.7	-0.157
8	15 15 52.56	2.3271	22 37 29.2	7.043	8	17 14 32.58	2.5899	25 36 41.0	+0.013
9	15 18 12.39	2.3338	22 44 28.3	6.925	9	17 17 8.08	2.5932	25 36 35.1	0.184
10	15 20 32.62	2.3405	22 51 20.2	6.805	10	17 19 43.76	2.5963	25 36 18.9	0.357
11	15 22 53.25	2.3472	22 58 4.9	6.684	11	17 22 19.63	2.5993	25 35 52.3	0.530
12	15 25 14.28	2.3538	23 4 42.3	6.562	12	17 24 55.68	2.6023	25 35 15.3	0.703
13	15 27 35.71	2.3605	23 11 12.3	6.438	13	17 27 31.90	2.6049	25 34 27.9	0.876
14	15 29 57.54	2.3671	23 17 34.9	6.314	14	17 30 8.27	2.6075	25 33 30.2	1.050
15	15 32 19.76	2.3737	23 23 50.0	6.188	15	17 32 44.80	2.6100	25 32 21.9	1.226
16	15 34 42.38	2.3802	23 29 57.4	6.059	16	17 35 21.47	2.6123	25 31 3.1	1.400
17	15 37 5.38	2.3867	23 35 57.1	5.930	17	17 37 58.28	2.6146	25 29 33.9	1.575
18	15 39 28.78	2.3933	23 41 49.0	5.801	18	17 40 35.22	2.6166	25 27 54.1	1.752
19	15 41 52.57	2.3997	23 47 33.2	5.669	19	17 43 12.27	2.6185	25 26 3.7	1.928
20	15 44 16.74	2.4061	23 53 9.3	5.536	20	17 45 49.44	2.6203	25 24 2.8	2.104
21	15 46 41.30	2.4124	23 58 37.5	5.403	21	17 48 26.71	2.6221	25 21 51.2	2.281
22	15 49 6.23	2.4188	24 3 57.6	5.268	22	17 51 4.09	2.6236	25 19 29.1	2.457
23	15 51 31.55	2.4251	-24 9 9.6	-5.130	23	17 53 41.54	2.6249	-25 16 56.4	+2.634
FEBRUARY 15.					FEBRUARY 17.				
0	15 53 57.24	2.4313	-24 14 13.2	-4.992	0	17 56 19.08	2.6263	-25 14 13.0	+2.812
1	15 56 23.30	2.4375	24 19 8.6	4.853	1	17 58 56.69	2.6274	25 11 19.0	2.989
2	15 58 49.74	2.4437	24 23 55.6	4.713	2	18 1 34.37	2.6283	25 8 14.3	3.168
3	16 1 16.54	2.4497	24 28 34.1	4.570	3	18 4 12.09	2.6292	25 4 58.9	3.345
4	16 3 43.70	2.4557	24 33 4.0	4.428	4	18 6 49.87	2.6300	25 1 32.9	3.522
5	16 6 11.22	2.4616	24 37 25.4	4.284	5	18 9 27.69	2.6305	24 57 56.3	3.699
6	16 8 39.09	2.4675	24 41 38.1	4.138	6	18 12 5.53	2.6309	24 54 9.0	3.878
7	16 11 7.32	2.4734	24 45 42.0	3.992	7	18 14 43.40	2.6313	24 50 11.0	4.055
8	16 13 35.90	2.4791	24 49 37.1	3.844	8	18 17 21.29	2.6315	24 46 2.4	4.232
9	16 16 4.81	2.4848	24 53 23.3	3.695	9	18 19 59.18	2.6315	24 41 43.2	4.409
10	16 18 34.07	2.4904	24 57 0.5	3.545	10	18 22 37.07	2.6314	24 37 13.3	4.586
11	16 21 3.66	2.4959	25 0 28.7	3.393	11	18 25 14.95	2.6313	24 32 32.9	4.763
12	16 23 33.58	2.5014	25 3 47.7	3.241	12	18 27 52.82	2.6309	24 27 41.8	4.939
13	16 26 3.83	2.5068	25 6 57.6	3.088	13	18 30 30.66	2.6304	24 22 40.2	5.115
14	16 28 34.39	2.5120	25 9 58.3	2.933	14	18 33 8.47	2.6298	24 17 28.0	5.292
15	16 31 5.27	2.5172	25 12 49.6	2.778	15	18 35 46.23	2.6290	24 12 5.2	5.467
16	16 33 36.45	2.5223	25 15 31.6	2.622	16	18 38 23.95	2.6283	24 6 32.0	5.641
17	16 36 7.95	2.5273	25 18 4.2	2.463	17	18 41 1.62	2.6273	24 0 48.3	5.816
18	16 38 39.73	2.5322	25 20 27.2	2.304	18	18 43 39.22	2.6260	23 54 54.1	5.989
19	16 41 11.81	2.5371	25 22 40.7	2.145	19	18 46 16.74	2.6248	23 48 49.6	6.163
20	16 43 44.18	2.5418	25 24 44.6	1.984	20	18 48 54.20	2.6235	23 42 34.6	6.336
21	16 46 16.82	2.5463	25 26 38.8	1.823	21	18 51 31.56	2.6220	23 36 9.3	6.508
22	16 48 49.74	2.5509	25 28 23.3	1.659	22	18 54 8.84	2.6204	23 29 33.7	6.678
23	16 51 22.93	2.5553	25 29 57.9	1.495	23	18 56 46.01	2.6187	23 22 47.9	6.849
24	16 53 56.38	2.5597	-25 31 22.7	-1.331	24	18 59 23.08	2.6168	-23 15 51.8	+7.020

MOON, 1917.  
GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 18.					FEBRUARY 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 59 23.08	2.6168	-23 15 51.8	+ 7.020	0	21 1 17.05	2.4419	-14 44 39.5	+13.713
1	19 2 0.03	2.6149	23 8 45.5	7.189	1	21 3 43.43	2.4375	14 30 53.8	13.811
2	19 4 36.87	2.6129	23 1 29.1	7.358	2	21 6 9.55	2.4332	14 17 2.2	13.908
3	19 7 13.58	2.6107	22 54 2.6	7.525	3	21 8 35.41	2.4288	14 3 4.9	14.002
4	19 9 50.15	2.6084	22 46 26.1	7.692	4	21 11 1.00	2.4243	13 49 2.0	14.095
5	19 12 26.59	2.6061	22 38 39.6	7.858	5	21 13 26.33	2.4200	13 34 53.5	14.186
6	19 15 2.88	2.6036	22 30 43.2	8.023	6	21 15 51.40	2.4156	13 20 39.7	14.274
7	19 17 39.02	2.6011	22 22 36.9	8.187	7	21 18 16.20	2.4113	13 6 20.6	14.362
8	19 20 15.01	2.5984	22 14 20.8	8.350	8	21 20 40.75	2.4070	12 51 56.3	14.446
9	19 22 50.83	2.5956	22 5 54.9	8.513	9	21 23 5.04	2.4027	12 37 27.1	14.528
10	19 25 26.48	2.5928	21 57 19.3	8.673	10	21 25 29.07	2.3984	12 22 52.9	14.610
11	19 28 1.96	2.5898	21 48 34.2	8.832	11	21 27 52.85	2.3942	12 8 13.9	14.688
12	19 30 37.26	2.5868	21 39 39.5	8.991	12	21 30 16.37	2.3899	11 53 30.3	14.765
13	19 33 12.38	2.5837	21 30 35.3	9.148	13	21 32 39.64	2.3858	11 38 42.1	14.840
14	19 35 47.30	2.5804	21 21 21.7	9.304	14	21 35 2.66	2.3816	11 23 49.5	14.918
15	19 38 22.03	2.5773	21 11 58.8	9.459	15	21 37 25.43	2.3774	11 8 52.5	14.984
16	19 40 56.57	2.5739	21 2 26.6	9.613	16	21 39 47.95	2.3734	10 53 51.4	15.053
17	19 43 30.90	2.5704	20 52 45.2	9.766	17	21 42 10.24	2.3693	10 38 46.2	15.119
18	19 46 5.02	2.5670	20 42 54.7	9.917	18	21 44 32.27	2.3653	10 23 37.1	15.183
19	19 48 38.94	2.5634	20 32 55.2	10.066	19	21 46 54.07	2.3614	10 8 24.2	15.246
20	19 51 12.63	2.5598	20 22 46.8	10.215	20	21 49 15.64	2.3574	9 53 7.6	15.307
21	19 53 46.11	2.5561	20 12 29.4	10.362	21	21 51 36.96	2.3535	9 37 47.4	15.365
22	19 56 19.36	2.5523	20 2 3.4	10.507	22	21 53 58.06	2.3497	9 22 23.8	15.422
23	19 58 52.39	2.5485	-19 51 28.6	+10.651	23	21 56 18.92	2.3458	- 9 6 56.8	+15.476
FEBRUARY 19.					FEBRUARY 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 1 25.18	2.5446	-19 40 45.3	+10.793	0	21 58 39.56	2.3421	- 8 51 26.7	+15.528
1	20 3 57.74	2.5408	19 29 53.4	10.934	1	22 0 59.97	2.3383	8 35 53.5	15.578
2	20 6 30.07	2.5368	19 18 53.2	11.073	2	22 3 20.16	2.3347	8 20 17.3	15.627
3	20 9 2.15	2.5328	19 7 44.6	11.212	3	22 5 40.13	2.3311	8 4 38.3	15.673
4	20 11 34.00	2.5287	18 56 27.8	11.348	4	22 7 59.89	2.3275	7 48 56.6	15.717
5	20 14 5.59	2.5245	18 45 2.8	11.483	5	22 10 19.43	2.3239	7 33 12.3	15.759
6	20 16 36.94	2.5204	18 33 29.8	11.616	6	22 12 38.76	2.3204	7 17 25.5	15.798
7	20 19 8.04	2.5163	18 21 48.9	11.748	7	22 14 57.88	2.3170	7 1 36.5	15.837
8	20 21 38.89	2.5121	18 10 0.1	11.878	8	22 17 16.80	2.3137	6 45 45.1	15.873
9	20 24 9.49	2.5078	17 58 3.6	12.005	9	22 19 35.52	2.3104	6 29 51.7	15.907
10	20 26 39.82	2.5034	17 45 59.5	12.132	10	22 21 54.05	2.3071	6 13 56.3	15.938
11	20 29 9.90	2.4993	17 33 47.8	12.257	11	22 24 12.37	2.3038	5 57 59.1	15.968
12	20 31 39.73	2.4949	17 21 28.7	12.379	12	22 26 30.50	2.3007	5 42 0.1	15.997
13	20 34 9.29	2.4905	17 9 2.3	12.501	13	22 28 48.45	2.2976	5 25 59.5	16.023
14	20 36 38.59	2.4862	16 56 28.6	12.620	14	22 31 6.21	2.2945	5 9 57.4	16.047
15	20 39 7.63	2.4818	16 43 47.9	12.738	15	22 33 23.79	2.2915	4 53 53.9	16.068
16	20 41 36.41	2.4774	16 31 0.1	12.853	16	22 35 41.19	2.2886	4 37 49.2	16.088
17	20 44 4.92	2.4729	16 18 5.5	12.967	17	22 37 58.42	2.2858	4 21 43.3	16.107
18	20 46 33.16	2.4685	16 5 4.1	13.079	18	22 40 15.48	2.2830	4 5 36.4	16.123
19	20 49 1.14	2.4642	15 51 56.0	13.189	19	22 42 32.38	2.2803	3 49 28.6	16.137
20	20 51 28.86	2.4597	15 38 41.4	13.298	20	22 44 49.11	2.2775	3 33 20.0	16.149
21	20 53 56.30	2.4553	15 25 20.3	13.404	21	22 47 5.68	2.2748	3 17 10.7	16.159
22	20 56 23.49	2.4508	15 11 52.9	13.508	22	22 49 22.09	2.2723	3 1 0.9	16.168
23	20 58 50.40	2.4463	14 58 19.3	13.612	23	22 51 38.35	2.2698	2 44 50.6	16.174
24	21 1 17.05	2.4419	-14 44 39.5	+13.713	24	22 53 54.46	2.2673	- 2 28 40.0	+16.178





## MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Var. per Min.
MARCH					
	h	m	s	s	"
0	6	6	54.13	2.2020	7.025
1	6	9	6.16	2.1990	8.012
2	6	11	18.00	2.1957	8.008
3	6	13	29.64	2.1925	8.183
4	6	15	41.10	2.1892	8.267
5	6	17	52.35	2.1859	8.350
6	6	20	3.41	2.1827	8.433
7	6	22	14.27	2.1793	8.516
8	6	24	24.93	2.1760	8.597
9	6	26	35.39	2.1726	8.678
10	6	28	45.64	2.1691	8.758
11	6	30	55.68	2.1656	8.836
12	6	33	5.51	2.1622	8.914
13	6	35	15.14	2.1587	8.993
14	6	37	24.55	2.1551	9.070
15	6	39	33.75	2.1515	9.146
16	6	41	42.73	2.1479	9.221
17	6	43	51.50	2.1443	9.296
18	6	46	0.06	2.1407	9.370
19	6	48	8.38	2.1370	9.443
20	6	50	16.49	2.1334	9.515
21	6	52	24.39	2.1298	9.588
22	6	54	32.06	2.1259	9.658
23	6	56	39.50	2.1223	9.728
MARCH					
0	6	58	46.73	2.1186	9.796
1	7	0	53.73	2.1148	9.867
2	7	3	0.50	2.1110	9.935
3	7	5	7.05	2.1073	10.003
4	7	7	13.37	2.1034	10.069
5	7	9	19.46	2.0997	10.134
6	7	11	25.33	2.0968	10.199
7	7	13	30.96	2.0930	10.264
8	7	15	36.37	2.0893	10.328
9	7	17	41.55	2.0845	10.391
10	7	19	46.51	2.0807	10.453
11	7	21	51.23	2.0768	10.514
12	7	23	55.72	2.0729	10.575
13	7	25	59.98	2.0689	10.635
14	7	28	4.02	2.0653	10.694
15	7	30	7.82	2.0616	10.753
16	7	32	11.40	2.0577	10.811
17	7	34	14.74	2.0538	10.868
18	7	36	17.86	2.0501	10.923
19	7	38	20.75	2.0463	10.979
20	7	40	23.41	2.0424	11.034
21	7	42	25.84	2.0386	11.088
22	7	44	28.04	2.0348	11.141
23	7	46	30.02	2.0312	11.193
24	7	48	31.78	2.0274	11.246

**MOON, 1917.**

**MEAN TIME.**







GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 18.					MARCH 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 39 15.65	2.4828	-20 57 52.8	+ 9.094	0	21 34 37.41	2.3233	-11 20 43.1	+14.395
1	19 41 44.53	2.4799	20 48 42.9	9.236	1	21 36 56.72	2.3203	11 6 17.2	14.468
2	19 44 13.24	2.4769	20 39 24.5	9.377	2	21 39 15.85	2.3173	10 51 47.0	14.539
3	19 46 41.76	2.4738	20 29 57.7	9.516	3	21 41 34.80	2.3144	10 37 12.5	14.608
4	19 49 10.10	2.4708	20 20 22.6	9.655	4	21 43 53.58	2.3116	10 22 34.1	14.674
5	19 51 38.25	2.4677	20 10 39.1	9.793	5	21 46 12.19	2.3088	10 7 51.6	14.741
6	19 54 6.22	2.4646	20 0 47.5	9.928	6	21 48 30.63	2.3058	9 53 5.2	14.804
7	19 56 34.00	2.4613	19 50 47.7	10.064	7	21 50 48.89	2.3031	9 38 15.1	14.865
8	19 59 1.58	2.4581	19 40 39.8	10.198	8	21 53 7.00	2.3004	9 23 21.4	14.925
9	20 1 28.97	2.4548	19 30 24.0	10.330	9	21 55 24.94	2.2977	9 8 24.1	14.984
10	20 3 56.16	2.4516	19 20 0.2	10.462	10	21 57 42.72	2.2951	8 53 23.3	15.041
11	20 6 23.16	2.4483	19 9 28.6	10.593	11	22 0 0.35	2.2925	8 38 19.2	15.095
12	20 8 49.95	2.4448	18 58 49.1	10.722	12	22 2 17.82	2.2899	8 23 11.9	15.148
13	20 11 16.54	2.4416	18 48 2.0	10.849	13	22 4 35.14	2.2875	8 8 1.4	15.200
14	20 13 42.94	2.4382	18 37 7.2	10.976	14	22 6 52.32	2.2851	7 52 47.9	15.249
15	20 16 9.12	2.4347	18 26 4.9	11.100	15	22 9 9.35	2.2827	7 37 31.5	15.297
16	20 18 35.10	2.4313	18 14 55.2	11.224	16	22 11 26.24	2.2803	7 22 12.3	15.343
17	20 21 0.88	2.4279	18 3 38.0	11.347	17	22 13 42.99	2.2780	7 6 50.4	15.387
18	20 23 26.45	2.4244	17 52 13.6	11.468	18	22 15 59.60	2.2758	6 51 25.9	15.429
19	20 25 51.81	2.4209	17 40 41.9	11.588	19	22 18 16.08	2.2737	6 35 58.9	15.470
20	20 28 16.96	2.4174	17 29 3.1	11.705	20	22 20 32.44	2.2715	6 20 29.5	15.509
21	20 30 41.90	2.4139	17 17 17.3	11.823	21	22 22 48.66	2.2694	6 4 57.8	15.546
22	20 33 6.63	2.4104	17 5 24.4	11.938	22	22 25 4.77	2.2674	5 49 24.0	15.581
23	20 35 31.15	2.4070	-16 53 24.7	+12.052	23	22 27 20.75	2.2653	- 5 33 48.1	+15.614
MARCH 19.					MARCH 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 37 55.47	2.4035	-16 41 18.2	+12.164	0	22 29 36.61	2.2634	- 5 18 10.3	+15.645
1	20 40 19.57	2.3999	16 29 5.0	12.275	1	22 31 52.36	2.2617	5 2 30.7	15.675
2	20 42 43.46	2.3965	16 16 45.2	12.385	2	22 34 8.01	2.2599	4 46 49.3	15.703
3	20 45 7.15	2.3930	16 4 18.8	12.493	3	22 36 23.55	2.2581	4 31 6.3	15.729
4	20 47 30.62	2.3895	15 51 46.0	12.600	4	22 38 38.98	2.2564	4 15 21.8	15.753
5	20 49 53.89	2.3860	15 39 6.8	12.705	5	22 40 54.32	2.2548	3 59 35.9	15.776
6	20 52 16.94	2.3825	15 26 21.4	12.808	6	22 43 9.56	2.2533	3 43 48.7	15.797
7	20 54 39.79	2.3791	15 13 29.8	12.910	7	22 45 24.71	2.2517	3 28 0.3	15.815
8	20 57 2.43	2.3757	15 0 32.2	13.010	8	22 47 39.76	2.2503	3 12 10.9	15.833
9	20 59 24.87	2.3722	14 47 28.6	13.109	9	22 49 54.74	2.2489	2 56 20.4	15.848
10	21 1 47.09	2.3688	14 34 19.1	13.208	10	22 52 9.63	2.2475	2 40 29.2	15.861
11	21 4 9.12	2.3654	14 21 3.7	13.303	11	22 54 24.44	2.2462	2 24 37.1	15.873
12	21 6 30.94	2.3620	14 7 42.8	13.396	12	22 56 39.17	2.2450	2 8 44.4	15.883
13	21 8 52.56	2.3587	13 54 16.2	13.488	13	22 58 53.84	2.2438	1 52 51.2	15.890
14	21 11 13.98	2.3553	13 40 44.2	13.579	14	23 1 8.43	2.2428	1 36 57.6	15.897
15	21 13 35.19	2.3519	13 27 6.7	13.668	15	23 3 22.97	2.2418	1 21 3.6	15.902
16	21 15 56.21	2.3487	13 13 24.0	13.756	16	23 5 37.44	2.2407	1 5 9.4	15.903
17	21 18 17.03	2.3454	12 59 36.0	13.843	17	23 7 51.85	2.2398	0 49 15.2	15.904
18	21 20 37.66	2.3422	12 45 42.9	13.926	18	23 10 6.21	2.2389	0 33 20.9	15.904
19	21 22 58.09	2.3389	12 31 44.9	14.009	19	23 12 20.52	2.2382	0 17 26.7	15.901
20	21 25 18.33	2.3358	12 17 41.9	14.089	20	23 14 34.79	2.2374	- 0 1 32.8	15.897
21	21 27 38.38	2.3327	12 3 34.2	14.168	21	23 16 49.01	2.2366	+ 0 14 20.9	15.891
22	21 29 58.25	2.3295	11 49 21.7	14.247	22	23 19 3.18	2.2360	0 30 14.1	15.882
23	21 32 17.92	2.3263	11 35 4.6	14.322	23	23 21 17.33	2.2355	0 46 6.7	15.872
24	21 34 37.41	2.3233	-11 20 43.1	+14.395	24	23 23 31.44	2.2349	+ 1 1 58.7	+15.861



## MEAN TIME.

## MARCH 26.

	h	m	s	s	"	"	"
0	3	2	4.64	2.3400	+21 35 32.7	+7.851	
1	3	4	25.43	2.3470	21 43 19.7	7.717	
2	3	6	46.28	2.3490	21 50 58.7	7.582	
3	3	9	7.19	2.3489	21 58 29.5	7.446	
4	3	11	28.15	2.3496	22 5 52.2	7.309	
5	3	13	49.16	2.3506	22 13 6.6	7.173	
6	3	16	10.22	2.3514	22 20 12.9	7.037	
7	3	18	31.33	2.3521	22 27 11.0	6.899	
8	3	20	52.47	2.3528	22 34 0.8	6.762	
9	3	23	13.66	2.3533	22 40 42.4	6.623	
10	3	25	34.87	2.3535	22 47 15.6	6.484	
11	3	27	56.12	2.3544	22 53 40.5	6.346	
12	3	30	17.40	2.3548	22 59 57.1	6.207	
13	3	32	38.70	2.3552	23 6 5.3	6.068	
14	3	35	0.02	2.3555	23 12 5.2	5.928	
15	3	37	21.36	2.3558	23 17 56.6	5.788	
16	3	39	42.71	2.3565	23 23 39.7	5.648	
17	3	42	4.06	2.3561	23 29 14.4	5.508	
18	3	44	25.44	2.3561	23 34 40.6	5.367	
19	3	46	46.81	2.3562	23 39 58.4	5.226	
20	3	49	8.18	2.3561	23 45 7.7	5.085	
21	3	51	29.54	2.3560	23 50 8.6	4.944	
22	3	53	50.90	2.3558	23 55 1.0	4.803	
23	3	56	12.24	2.3555	+23 59 44.9	+4.662	

## MARCH 27.

	h	m	s	s	"	"	"
0	3	58	33.56	2.3552	+24 4 20.4	+4.521	
1	4	0	54.86	2.3548	24 8 47.4	4.378	
2	4	3	16.14	2.3543	24 13 5.8	4.237	
3	4	5	37.38	2.3538	24 17 15.8	4.095	
4	4	7	58.59	2.3532	24 21 17.2	3.953	
5	4	10	19.77	2.3526	24 25 10.2	3.813	
6	4	12	40.90	2.3519	24 28 54.7	3.671	
7	4	15	1.99	2.3510	24 32 30.7	3.528	
8	4	17	23.02	2.3501	24 35 58.1	3.387	
9	4	19	44.00	2.3492	24 39 17.1	3.247	
10	4	22	4.92	2.3483	24 42 27.7	3.105	
11	4	24	25.78	2.3470	24 45 29.7	2.963	
12	4	26	46.56	2.3458	24 48 23.3	2.823	
13	4	29	7.28	2.3447	24 51 8.4	2.682	
14	4	31	27.92	2.3433	24 53 45.1	2.541	
15	4	33	48.48	2.3420	24 56 13.3	2.400	
16	4	36	8.96	2.3408	24 58 33.1	2.260	
17	4	38	29.34	2.3390	25 0 44.5	2.120	
18	4	40	49.64	2.3373	25 2 47.5	1.980	
19	4	43	9.84	2.3358	25 4 42.1	1.840	
20	4	45	29.93	2.3340	25 6 28.3	1.701	
21	4	47	49.92	2.3323	25 8 6.2	1.563	
22	4	50	9.80	2.3304	25 9 35.8	1.423	
23	4	52	29.57	2.3285	25 10 57.0	1.284	
24	4	54	49.22	2.3265	+25 12 9.9	+1.146	

## MARCH 28.

	h	m	s	s	"	"	"
0	4	54	49.22	2.3265	+25 12 9.9	+1.146	
1	4	57	8.75	2.3244	25 13 14.5	1.008	
2	4	59	28.15	2.3223	25 14 10.9	0.872	
3	5	1	47.42	2.3201	25 14 59.1	0.734	
4	5	4	6.56	2.3178	25 15 39.0	0.597	
5	5	6	25.56	2.3155	25 16 10.7	0.461	
6	5	8	44.42	2.3131	25 16 34.3	0.325	
7	5	11	3.13	2.3107	25 16 49.7	0.189	
8	5	13	21.70	2.3082	25 16 57.0	+0.054	
9	5	15	40.11	2.3056	25 16 56.2	-0.080	
10	5	17	58.36	2.3029	25 16 47.4	0.214	
11	5	20	16.46	2.3002	25 16 30.5	0.348	
12	5	22	34.38	2.2973	25 16 5.6	0.482	
13	5	24	52.14	2.2946	25 15 32.7	0.614	
14	5	27	9.73	2.2917	25 14 51.9	0.746	
15	5	29	27.14	2.2887	25 14 3.2	0.878	
16	5	31	44.37	2.2857	25 13 6.6	1.010	
17	5	34	1.42	2.2827	25 12 2.1	1.140	
18	5	36	18.29	2.2796	25 10 49.8	1.270	
19	5	38	34.97	2.2763	25 9 29.7	1.399	
20	5	40	51.45	2.2731	25 8 1.9	1.528	
21	5	43	7.74	2.2699	25 6 26.3	1.657	
22	5	45	23.84	2.2666	25 4 43.1	1.784	
23	5	47	39.73	2.2632	+25 2 52.2	-1.912	

## MARCH 29.

	h	m	s	s	"	"	"
0	5	49	55.42	2.2598	+25 0 53.7	-2.038	
1	5	52	10.90	2.2563	24 58 47.7	1.870	
2	5	54	26.18	2.2528	24 56 34.1	2.289	
3	5	56	41.24	2.2492	24 54 13.0	2.413	
4	5	58	56.08	2.2456	24 51 44.5	2.538	
5	6	1	10.71	2.2420	24 49 8.5	2.661	
6	6	3	25.12	2.2383	24 46 25.2	2.783	
7	6	5	39.31	2.2346	24 43 34.6	2.905	
8	6	7	53.27	2.2308	24 40 36.6	3.027	
9	6	10	7.00	2.2270	24 37 31.4	3.147	
10	6	12	20.51	2.2232	24 34 19.0	3.267	
11	6	14	33.78	2.2193	24 30 59.4	3.387	
12	6	16	46.83	2.2155	24 27 32.6	3.505	
13	6	18	59.64	2.2116	24 23 58.8	3.623	
14	6	21	12.21	2.2078	24 20 17.9	3.740	
15	6	23	24.54	2.2038	24 16 30.0	3.857	
16	6	25	36.64	2.1996	24 12 35.1	3.973	
17	6	27	48.49	2.1954	24 8 33.4	4.087	
18	6	30	0.09	2.1914	24 4 24.7	4.201	
19	6	32	11.46	2.1873	24 0 9.3	4.314	
20	6	34	22.57	2.1832	23 55 47.0	4.427	
21	6	36	33.44	2.1790	23 51 18.1	4.538	
22	6	38	44.05	2.1748	23 46 42.4	4.651	
23	6	40	54.42	2.1706	23 42 0.0	4.761	
24	6	43	4.54	2.1665	+23 37 11.1	-4.870	







## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 11.					APRIL 13.				
0	h m s 16 24 46.84	2.4553	° ' " ° -24 38 20.8	-3.038	0	h m s 18 24 45.67	2.5029	° ' " ° -24 5 12.5	+ 4.480
1	16 27 14.26	2.4567	24 41 18.6	2.889	1	18 27 15.80	2.5014	24 0 39.1	4.635
2	16 29 41.88	2.4620	24 44 7.5	2.741	2	18 29 45.84	2.4998	23 55 56.3	4.790
3	16 32 9.70	2.4653	24 46 47.5	2.591	3	18 32 15.77	2.4980	23 51 4.3	4.943
4	16 34 37.71	2.4684	24 49 18.4	2.440	4	18 34 45.60	2.4963	23 46 3.1	5.097
5	16 37 5.91	2.4715	24 51 40.3	2.289	5	18 37 15.32	2.4943	23 40 52.7	5.251
6	16 39 34.29	2.4744	24 53 53.1	2.138	6	18 39 44.92	2.4923	23 35 33.0	5.403
7	16 42 2.84	2.4773	24 55 56.8	1.985	7	18 42 14.39	2.4902	23 30 4.3	5.554
8	16 44 31.56	2.4801	24 57 51.3	1.833	8	18 44 43.74	2.4881	23 24 26.5	5.706
9	16 47 0.45	2.4828	24 59 36.7	1.679	9	18 47 12.96	2.4858	23 18 39.6	5.857
10	16 49 29.49	2.4853	25 1 12.8	1.524	10	18 49 42.04	2.4835	23 12 43.7	6.007
11	16 51 58.68	2.4878	25 2 39.6	1.370	11	18 52 10.98	2.4811	23 6 38.8	6.156
12	16 54 28.02	2.4902	25 3 57.2	1.215	12	18 54 39.77	2.4786	23 0 25.0	6.304
13	16 56 57.50	2.4924	25 5 5.4	1.059	13	18 57 8.41	2.4761	22 54 2.3	6.453
14	16 59 27.11	2.4945	25 6 4.3	0.904	14	18 59 36.90	2.4735	22 47 30.7	6.600
15	17 1 56.84	2.4965	25 6 53.9	0.748	15	19 2 5.23	2.4708	22 40 50.3	6.746
16	17 4 26.69	2.4985	25 7 34.0	0.590	16	19 4 33.40	2.4681	22 34 1.2	6.891
17	17 6 56.66	2.5003	25 8 4.7	0.433	17	19 7 1.40	2.4653	22 27 3.4	7.036
18	17 9 26.73	2.5020	25 8 26.0	0.276	18	19 9 29.23	2.4624	22 19 56.9	7.180
19	17 11 56.90	2.5036	25 8 37.8	-0.118	19	19 11 56.89	2.4595	22 12 41.8	7.323
20	17 14 27.16	2.5052	25 8 40.1	+0.040	20	19 14 24.37	2.4565	22 5 18.2	7.464
21	17 16 57.52	2.5066	25 8 33.0	0.198	21	19 16 51.67	2.4534	21 57 46.1	7.606
22	17 19 27.95	2.5078	25 8 16.3	0.358	22	19 19 18.78	2.4503	21 50 5.5	7.747
23	17 21 58.45	2.5089	-25 7 50.1	+0.516	23	19 21 45.71	2.4473	-21 42 16.5	+ 7.886
APRIL 12.					APRIL 14.				
0	17 24 29.02	2.5100	-25 7 14.4	+0.675	0	19 24 12.45	2.4440	-21 34 19.2	+ 8.024
1	17 26 59.65	2.5109	25 6 29.1	0.833	1	19 26 38.99	2.4408	21 26 13.6	8.162
2	17 29 30.33	2.5118	25 5 34.4	0.993	2	19 29 5.34	2.4375	21 17 59.8	8.298
3	17 32 1.06	2.5125	25 4 30.0	1.153	3	19 31 31.49	2.4342	21 9 37.9	8.433
4	17 34 31.83	2.5131	25 3 16.1	1.312	4	19 33 57.44	2.4308	21 1 7.9	8.568
5	17 37 2.63	2.5136	25 1 52.6	1.472	5	19 36 23.19	2.4274	20 52 29.8	8.701
6	17 39 33.46	2.5140	25 0 19.5	1.632	6	19 38 48.73	2.4239	20 43 43.8	8.833
7	17 42 4.31	2.5143	24 58 36.8	1.791	7	19 41 14.06	2.4204	20 34 49.8	8.965
8	17 44 35.18	2.5145	24 56 44.6	1.951	8	19 43 39.18	2.4169	20 25 48.0	9.095
9	17 47 6.05	2.5145	24 54 42.7	2.111	9	19 46 4.09	2.4134	20 16 38.4	9.225
10	17 49 36.92	2.5145	24 52 31.3	2.270	10	19 48 28.79	2.4099	20 7 21.0	9.353
11	17 52 7.79	2.5144	24 50 10.3	2.430	11	19 50 53.28	2.4063	19 57 56.0	9.480
12	17 54 38.65	2.5142	24 47 39.7	2.589	12	19 53 17.55	2.4027	19 48 23.4	9.606
13	17 57 9.49	2.5138	24 44 59.6	2.748	13	19 55 41.60	2.3990	19 38 43.3	9.730
14	17 59 40.30	2.5133	24 42 10.0	2.906	14	19 58 5.43	2.3954	19 28 55.8	9.854
15	18 2 11.08	2.5127	24 39 10.9	3.065	15	20 0 29.05	2.3918	19 19 0.8	9.977
16	18 4 41.82	2.5120	24 36 2.2	3.223	16	20 2 52.44	2.3880	19 8 58.6	10.098
17	18 7 12.52	2.5113	24 32 44.1	3.382	17	20 5 15.61	2.3843	18 58 49.1	10.218
18	18 9 43.17	2.5103	24 29 16.4	3.540	18	20 7 38.55	2.3806	18 48 32.5	10.336
19	18 12 13.76	2.5093	24 25 39.3	3.697	19	20 10 1.28	2.3769	18 38 8.8	10.453
20	18 14 44.29	2.5083	24 21 52.8	3.854	20	20 12 23.78	2.3731	18 27 38.1	10.570
21	18 17 14.75	2.5071	24 17 56.8	4.012	21	20 14 46.05	2.3694	18 17 0.4	10.686
22	18 19 45.14	2.5058	24 13 51.4	4.168	22	20 17 8.11	2.3658	18 6 15.8	10.799
23	18 22 15.45	2.5044	24 9 36.7	4.324	23	20 19 29.94	2.3619	17 55 24.5	10.912
24	18 24 45.67	2.5029	-24 5 12.5	+4.480	24	20 21 51.54	2.3582	-17 44 26.4	+11.026





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GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 26.					JUNE 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 20 4.85	1.8009	- 1 7 20.8	-12.553	0	12 49 0.97	1.9323	-10 58 53.2	-11.813
1	11 21 52.94	1.8020	1 19 54.0	12.554	1	12 50 57.04	1.9368	11 10 40.9	11.778
2	11 23 41.09	1.8032	1 32 27.3	12.554	2	12 52 53.38	1.9413	11 22 26.5	11.743
3	11 25 29.32	1.8043	1 45 0.5	12.553	3	12 54 49.99	1.9458	11 34 10.0	11.706
4	11 27 17.61	1.8056	1 57 33.7	12.553	4	12 56 46.88	1.9506	11 45 51.2	11.668
5	11 29 5.99	1.8070	2 10 6.9	12.552	5	12 58 44.06	1.9554	11 57 30.2	11.630
6	11 30 54.45	1.8083	2 22 39.9	12.549	6	13 0 41.53	1.9602	12 9 6.8	11.590
7	11 32 42.99	1.8098	2 35 12.8	12.547	7	13 2 39.28	1.9650	12 20 41.0	11.550
8	11 34 31.63	1.8114	2 47 45.5	12.543	8	13 4 37.33	1.9700	12 32 12.8	11.509
9	11 36 20.36	1.8129	3 0 17.9	12.538	9	13 6 35.68	1.9751	12 43 42.1	11.467
10	11 38 9.18	1.8147	3 12 50.1	12.534	10	13 8 34.34	1.9802	12 55 8.8	11.423
11	11 39 58.12	1.8165	3 25 22.0	12.528	11	13 10 33.30	1.9853	13 6 32.9	11.378
12	11 41 47.16	1.8183	3 37 53.5	12.522	12	13 12 32.58	1.9906	13 17 54.2	11.333
13	11 43 36.31	1.8203	3 50 24.6	12.515	13	13 14 32.17	1.9958	13 29 12.8	11.288
14	11 45 25.59	1.8223	4 2 55.3	12.508	14	13 16 32.08	2.0013	13 40 28.7	11.240
15	11 47 14.98	1.8242	4 15 25.5	12.499	15	13 18 32.32	2.0067	13 51 41.6	11.192
16	11 49 4.49	1.8263	4 27 55.2	12.490	16	13 20 32.88	2.0121	14 2 51.7	11.143
17	11 50 54.14	1.8286	4 40 24.3	12.480	17	13 22 33.77	2.0177	14 13 58.7	11.092
18	11 52 43.92	1.8308	4 52 52.8	12.470	18	13 24 35.00	2.0233	14 25 2.7	11.040
19	11 54 33.84	1.8332	5 5 20.7	12.459	19	13 26 36.57	2.0289	14 36 3.5	10.988
20	11 56 23.90	1.8355	5 17 47.9	12.448	20	13 28 38.47	2.0347	14 47 1.2	10.934
21	11 58 14.10	1.8380	5 30 14.4	12.435	21	13 30 40.73	2.0405	14 57 55.6	10.879
22	12 0 4.46	1.8407	5 42 40.1	12.422	22	13 32 43.33	2.0463	15 8 46.7	10.823
23	12 1 54.98	1.8433	- 5 55 5.0	-12.408	23	13 34 46.29	2.0523	-15 19 34.4	-10.767
JUNE 27.					JUNE 29.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 3 45.65	1.8459	- 6 7 29.0	-12.393	0	13 36 49.60	2.0582	-15 30 18.7	-10.708
1	12 5 36.49	1.8487	6 19 52.2	12.378	1	13 38 53.27	2.0642	15 40 59.4	10.648
2	12 7 27.49	1.8515	6 32 14.4	12.363	2	13 40 57.30	2.0703	15 51 36.5	10.588
3	12 9 18.67	1.8545	6 44 35.7	12.346	3	13 43 1.70	2.0764	16 2 10.0	10.527
4	12 11 10.03	1.8574	6 56 55.9	12.328	4	13 45 6.47	2.0827	16 12 39.7	10.463
5	12 13 1.56	1.8605	7 9 15.1	12.310	5	13 47 11.62	2.0889	16 23 5.6	10.400
6	12 14 53.29	1.8637	7 21 33.1	12.291	6	13 49 17.14	2.0952	16 33 27.7	10.335
7	12 16 45.20	1.8668	7 33 50.0	12.272	7	13 51 23.04	2.1015	16 43 45.8	10.268
8	12 18 37.31	1.8702	7 46 5.7	12.252	8	13 53 29.32	2.1078	16 53 59.8	10.200
9	12 20 29.61	1.8735	7 58 20.2	12.230	9	13 55 35.98	2.1143	17 4 9.8	10.133
10	12 22 22.12	1.8769	8 10 33.3	12.208	10	13 57 43.04	2.1208	17 14 15.7	10.062
11	12 24 14.84	1.8804	8 22 45.1	12.184	11	13 59 50.48	2.1273	17 24 17.2	9.990
12	12 26 7.77	1.8840	8 34 55.4	12.160	12	14 1 58.32	2.1339	17 34 14.5	9.918
13	12 28 0.92	1.8876	8 47 4.3	12.137	13	14 4 6.55	2.1405	17 44 7.4	9.844
14	12 29 54.28	1.8913	8 59 11.8	12.112	14	14 6 15.18	2.1473	17 53 55.8	9.768
15	12 31 47.87	1.8951	9 11 17.7	12.085	15	14 8 24.22	2.1539	18 3 39.6	9.692
16	12 33 41.69	1.8989	9 23 22.0	12.058	16	14 10 33.65	2.1607	18 13 18.8	9.614
17	12 35 35.74	1.9028	9 35 24.7	12.030	17	14 12 43.50	2.1675	18 22 53.3	9.536
18	12 37 30.03	1.9068	9 47 25.6	12.002	18	14 14 53.75	2.1743	18 32 23.1	9.455
19	12 39 24.56	1.9108	9 59 24.9	11.973	19	14 17 4.41	2.1811	18 41 47.9	9.373
20	12 41 19.33	1.9149	10 11 22.3	11.942	20	14 19 15.48	2.1879	18 51 7.9	9.291
21	12 43 14.35	1.9192	10 23 17.9	11.912	21	14 21 26.96	2.1949	19 0 22.8	9.206
22	12 45 9.63	1.9235	10 35 11.7	11.879	22	14 23 38.87	2.2019	19 9 32.6	9.120
23	12 47 5.17	1.9278	10 47 3.4	11.846	23	14 25 51.19	2.2088	19 18 37.2	9.033
24	12 49 0.97	1.9323	-10 58 53.2	-11.813	24	14 28 3.92	2.2158	-19 27 36.6	-8.945

**MEAN TIME.**

MOON, 1917.  
GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 4.					JULY 6.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 27 56.91	2.6381	-23 41 50.3	+ 5.123	0	20 30 55.76	2.4559	-16 36 34.0	+12.078
1	18 30 35.15	2.6367	23 36 37.8	5.294	1	20 33 22.96	2.4508	16 24 26.1	12.186
2	18 33 13.31	2.6351	23 31 15.0	5.466	2	20 35 49.85	2.4456	16 12 11.7	12.292
3	18 35 51.36	2.6333	23 25 41.9	5.636	3	20 38 16.43	2.4405	15 59 51.1	12.396
4	18 38 29.30	2.6314	23 19 58.7	5.804	4	20 40 42.71	2.4353	15 47 24.3	12.497
5	18 41 7.13	2.6295	23 14 5.4	5.973	5	20 43 8.67	2.4302	15 34 51.5	12.597
6	18 43 44.84	2.6273	23 8 1.9	6.142	6	20 45 34.33	2.4251	15 22 12.7	12.696
7	18 46 22.41	2.6251	23 1 48.4	6.308	7	20 47 59.68	2.4199	15 9 28.1	12.792
8	18 48 59.85	2.6228	22 55 24.9	6.474	8	20 50 24.72	2.4148	14 56 37.7	12.886
9	18 51 37.14	2.6202	22 48 51.5	6.639	9	20 52 49.46	2.4097	14 43 41.8	12.978
10	18 54 14.27	2.6176	22 42 8.2	6.804	10	20 55 13.88	2.4047	14 30 40.3	13.069
11	18 56 51.25	2.6149	22 35 15.0	6.968	11	20 57 38.00	2.3995	14 17 33.5	13.158
12	18 59 28.06	2.6120	22 28 12.1	7.130	12	21 0 1.82	2.3944	14 4 21.4	13.245
13	19 2 4.69	2.6091	22 20 59.4	7.292	13	21 2 25.33	2.3893	13 51 4.1	13.330
14	19 4 41.15	2.6060	22 13 37.1	7.452	14	21 4 48.54	2.3843	13 37 41.8	13.413
15	19 7 17.41	2.6028	22 6 5.2	7.611	15	21 7 11.45	2.3793	13 24 14.6	13.494
16	19 9 53.48	2.5996	21 58 23.8	7.769	16	21 9 34.06	2.3743	13 10 42.5	13.574
17	19 12 29.35	2.5961	21 50 32.9	7.927	17	21 11 56.37	2.3693	12 57 5.7	13.651
18	19 15 5.01	2.5926	21 42 32.6	8.083	18	21 14 18.38	2.3644	12 43 24.4	13.727
19	19 17 40.46	2.5890	21 34 23.0	8.238	19	21 16 40.10	2.3596	12 29 38.5	13.802
20	19 20 15.69	2.5853	21 26 4.1	8.391	20	21 19 1.53	2.3548	12 15 48.2	13.873
21	19 22 50.70	2.5815	21 17 36.1	8.543	21	21 21 22.67	2.3498	12 1 53.7	13.943
22	19 25 25.47	2.5777	21 8 59.0	8.693	22	21 23 43.51	2.3450	11 47 55.0	14.012
23	19 28 0.02	2.5738	-21 0 12.9	+ 8.843	23	21 26 4.07	2.3403	-11 33 52.3	+14.078
JULY 5.					JULY 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 30 34.32	2.5697	-20 51 17.8	+ 8.992	0	21 28 24.35	2.3357	-11 19 45.6	+14.143
1	19 33 8.38	2.5656	20 42 13.9	9.138	1	21 30 44.35	2.3309	11 5 35.1	14.206
2	19 35 42.19	2.5613	20 33 1.3	9.283	2	21 33 4.06	2.3263	10 51 21.0	14.266
3	19 38 15.74	2.5571	20 23 39.9	9.428	3	21 35 23.50	2.3218	10 37 3.2	14.326
4	19 40 49.04	2.5528	20 14 10.0	9.569	4	21 37 42.67	2.3173	10 22 41.9	14.383
5	19 43 22.08	2.5484	20 4 31.6	9.710	5	21 40 1.57	2.3128	10 8 17.3	14.438
6	19 45 54.85	2.5439	19 54 44.8	9.849	6	21 42 20.20	2.3083	9 53 49.4	14.492
7	19 48 27.35	2.5394	19 44 49.7	9.988	7	21 44 38.56	2.3038	9 39 18.3	14.543
8	19 50 59.58	2.5348	19 34 46.3	10.124	8	21 46 56.66	2.2995	9 24 44.2	14.593
9	19 53 31.53	2.5302	19 24 34.8	10.258	9	21 49 14.50	2.2953	9 10 7.1	14.641
10	19 56 3.20	2.5254	19 14 15.3	10.392	10	21 51 32.09	2.2910	8 55 27.3	14.687
11	19 58 34.58	2.5207	19 3 47.8	10.523	11	21 53 49.42	2.2868	8 40 44.7	14.733
12	20 1 5.68	2.5159	18 53 12.6	10.652	12	21 56 6.50	2.2827	8 25 59.4	14.775
13	20 3 36.49	2.5111	18 42 29.6	10.781	13	21 58 23.34	2.2787	8 11 11.7	14.815
14	20 6 7.01	2.5062	18 31 38.9	10.908	14	22 0 39.94	2.2747	7 56 21.6	14.854
15	20 8 37.23	2.5013	18 20 40.7	11.033	15	22 2 56.30	2.2707	7 41 29.2	14.892
16	20 11 7.16	2.4964	18 9 35.0	11.156	16	22 5 12.42	2.2668	7 26 34.6	14.928
17	20 13 36.80	2.4914	17 58 22.0	11.278	17	22 7 28.31	2.2629	7 11 37.9	14.961
18	20 16 6.13	2.4863	17 47 1.7	11.398	18	22 9 43.97	2.2592	6 56 39.3	14.993
19	20 18 35.16	2.4813	17 35 34.3	11.515	19	22 11 59.41	2.2555	6 41 38.8	15.023
20	20 21 3.89	2.4763	17 23 59.9	11.631	20	22 14 14.63	2.2518	6 26 36.5	15.052
21	20 23 32.31	2.4713	17 12 18.6	11.746	21	22 16 29.63	2.2483	6 11 32.6	15.078
22	20 26 0.44	2.4662	17 0 30.4	11.859	22	22 18 44.42	2.2447	5 56 27.1	15.104
23	20 28 28.25	2.4610	16 48 35.5	11.970	23	22 20 58.99	2.2412	5 41 20.1	15.128
24	20 30 55.76	2.4559	-16 36 34.0	+12.078	24	22 23 13.36	2.2378	- 5 26 11.8	+15.149

**ICH MEAN TIME.**





GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 16.					JULY 18.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	5 32 42.04	2.2896	+24 50 48.9	-1.272	0	7 18 58.42	2.1212	+21 30 32.0	-6.807
1	5 34 59.35	2.2873	24 49 28.7	1.401	1	7 21 5.56	2.1168	21 23 40.7	6.903
2	5 37 16.52	2.2851	24 48 0.8	1.530	2	7 23 12.44	2.1124	21 16 43.6	6.999
3	5 39 33.56	2.2828	24 46 25.1	1.659	3	7 25 19.05	2.1080	21 9 40.8	7.093
4	5 41 50.45	2.2802	24 44 41.7	1.788	4	7 27 25.40	2.1037	21 2 32.4	7.188
5	5 44 7.18	2.2777	24 42 50.6	1.916	5	7 29 31.49	2.0993	20 55 18.3	7.281
6	5 46 23.77	2.2752	24 40 51.8	2.043	6	7 31 37.32	2.0950	20 47 58.7	7.373
7	5 48 40.20	2.2725	24 38 45.4	2.170	7	7 33 42.89	2.0906	20 40 33.5	7.465
8	5 50 56.47	2.2698	24 36 31.4	2.297	8	7 35 48.19	2.0861	20 33 2.9	7.555
9	5 53 12.57	2.2670	24 34 9.8	2.423	9	7 37 53.22	2.0818	20 25 26.9	7.644
10	5 55 28.51	2.2642	24 31 40.7	2.548	10	7 39 58.00	2.0774	20 17 45.6	7.733
11	5 57 44.27	2.2612	24 29 4.1	2.673	11	7 42 2.51	2.0729	20 9 58.9	7.821
12	5 59 59.85	2.2583	24 26 19.9	2.798	12	7 44 6.75	2.0685	20 2 7.1	7.907
13	6 2 15.26	2.2553	24 23 28.4	2.921	13	7 46 10.73	2.0642	19 54 10.1	7.993
14	6 4 30.48	2.2522	24 20 29.4	3.044	14	7 48 14.45	2.0598	19 46 7.9	8.079
15	6 6 45.52	2.2491	24 17 23.1	3.166	15	7 50 17.90	2.0553	19 38 0.6	8.163
16	6 9 0.37	2.2458	24 14 9.5	3.288	16	7 52 21.09	2.0509	19 29 48.3	8.247
17	6 11 15.02	2.2426	24 10 48.5	3.410	17	7 54 24.01	2.0466	19 21 31.0	8.329
18	6 13 29.48	2.2393	24 7 20.3	3.530	18	7 56 26.68	2.0423	19 13 8.8	8.410
19	6 15 43.73	2.2359	24 3 44.9	3.650	19	7 58 29.08	2.0378	19 4 41.8	8.491
20	6 17 57.79	2.2325	24 0 2.3	3.769	20	8 0 31.22	2.0335	18 56 9.9	8.571
21	6 20 11.63	2.2290	23 56 12.6	3.888	21	8 2 33.10	2.0292	18 47 33.3	8.650
22	6 22 25.27	2.2256	23 52 15.7	4.006	22	8 4 34.72	2.0248	18 38 51.9	8.728
23	6 24 38.70	2.2220	+23 48 11.9	-4.123	23	8 6 36.08	2.0206	+18 30 5.9	-8.804
JULY 17.					JULY 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 26 51.91	2.2183	+23 44 1.0	-4.240	0	8 8 37.19	2.0163	+18 21 15.4	-8.880
1	6 29 4.90	2.2148	23 39 43.1	4.356	1	8 10 38.04	2.0120	18 12 20.3	8.956
2	6 31 17.68	2.2111	23 35 18.3	4.471	2	8 12 38.63	2.0078	18 3 20.7	9.031
3	6 33 30.23	2.2073	23 30 46.6	4.586	3	8 14 38.97	2.0036	17 54 16.6	9.105
4	6 35 42.55	2.2035	23 26 8.0	4.699	4	8 16 39.06	1.9993	17 45 8.1	9.178
5	6 37 54.65	2.1997	23 21 22.7	4.812	5	8 18 38.89	1.9951	17 35 55.3	9.248
6	6 40 6.51	2.1958	23 16 30.6	4.924	6	8 20 38.47	1.9910	17 26 38.3	9.319
7	6 42 18.14	2.1919	23 11 31.8	5.036	7	8 22 37.81	1.9868	17 17 17.0	9.390
8	6 44 29.54	2.1880	23 6 26.3	5.147	8	8 24 36.89	1.9827	17 7 51.5	9.459
9	6 46 40.70	2.1840	23 1 14.2	5.257	9	8 26 35.73	1.9786	16 58 21.9	9.528
10	6 48 51.62	2.1800	22 55 55.5	5.366	10	8 28 34.32	1.9745	16 48 48.2	9.595
11	6 51 2.30	2.1760	22 50 30.3	5.473	11	8 30 32.67	1.9704	16 39 10.5	9.661
12	6 53 12.74	2.1719	22 44 58.7	5.581	12	8 32 30.77	1.9663	16 29 28.9	9.726
13	6 55 22.93	2.1678	22 39 20.6	5.688	13	8 34 28.63	1.9624	16 19 43.4	9.792
14	6 57 32.87	2.1637	22 33 36.2	5.793	14	8 36 26.26	1.9585	16 9 53.9	9.856
15	6 59 42.57	2.1596	22 27 45.4	5.898	15	8 38 23.65	1.9545	16 0 0.7	9.918
16	7 1 52.02	2.1553	22 21 48.4	6.003	16	8 40 20.80	1.9506	15 50 3.7	9.980
17	7 4 1.21	2.1511	22 15 45.1	6.106	17	8 42 17.72	1.9467	15 40 3.1	10.042
18	7 6 10.15	2.1469	22 9 35.7	6.208	18	8 44 14.40	1.9428	15 29 58.7	10.103
19	7 8 18.84	2.1427	22 3 20.1	6.311	19	8 46 10.86	1.9391	15 19 50.8	10.162
20	7 10 27.27	2.1384	21 56 58.4	6.411	20	8 48 7.09	1.9353	15 9 39.3	10.221
21	7 12 35.45	2.1342	21 50 30.8	6.511	21	8 50 3.09	1.9315	14 59 24.3	10.279
22	7 14 43.37	2.1298	21 43 57.1	6.611	22	8 51 58.87	1.9278	14 49 5.8	10.337
23	7 16 51.02	2.1254	21 37 17.5	6.709	23	8 53 54.43	1.9242	14 38 43.9	10.392
24	7 18 58.42	2.1212	+21 30 32.0	-6.807	24	8 55 49.77	1.9205	+14 28 18.8	-10.447

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AUGUST 17.					AUGUST 19.				
0	9 29 34.57	1.8623	+11 15 52.9	-11.228	0	10 56 47.33	1.7912	+1 42 32.4	-12.385
1	9 31 26.23	1.8597	11 4 38.0	11.269	1	10 58 34.79	1.7910	1 30 9.1	12.391
2	9 33 17.73	1.8571	10 53 20.6	11.310	2	11 0 22.25	1.7909	1 17 45.5	12.397
3	9 35 9.08	1.8546	10 42 0.8	11.350	3	11 2 9.70	1.7908	1 5 21.5	12.403
4	9 37 0.28	1.8521	10 30 38.6	11.389	4	11 3 57.14	1.7908	0 52 57.2	12.408
5	9 38 51.33	1.8497	10 19 14.1	11.428	5	11 5 44.59	1.7908	0 40 32.6	12.412
6	9 40 42.24	1.8473	10 7 47.3	11.465	6	11 7 32.04	1.7909	0 28 7.8	12.415
7	9 42 33.00	1.8448	9 56 18.3	11.502	7	11 9 19.50	1.7911	0 15 42.8	12.418
8	9 44 23.62	1.8425	9 44 47.1	11.538	8	11 11 6.97	1.7913	+0 3 17.7	12.419
9	9 46 14.10	1.8403	9 33 13.8	11.573	9	11 12 54.45	1.7915	-0 9 7.5	12.421
10	9 48 4.45	1.8380	9 21 38.4	11.607	10	11 14 41.95	1.7919	0 21 32.8	12.421
11	9 49 54.66	1.8358	9 10 1.0	11.641	11	11 16 29.48	1.7923	0 33 58.0	12.421
12	9 51 44.75	1.8338	8 58 21.5	11.674	12	11 18 17.02	1.7926	0 46 23.3	12.421
13	9 53 34.71	1.8316	8 46 40.1	11.707	13	11 20 4.59	1.7932	0 58 48.5	12.418
14	9 55 24.54	1.8296	8 34 56.7	11.738	14	11 21 52.20	1.7938	1 11 13.5	12.417
15	9 57 14.26	1.8276	8 23 11.5	11.769	15	11 23 39.84	1.7943	1 23 38.5	12.414
16	9 59 3.85	1.8257	8 11 24.4	11.799	16	11 25 27.52	1.7949	1 36 3.2	12.410
17	10 0 53.34	1.8238	7 59 35.6	11.828	17	11 27 15.23	1.7957	1 48 27.7	12.406
18	10 2 42.71	1.8219	7 47 45.0	11.857	18	11 29 3.00	1.7965	2 0 51.9	12.400
19	10 4 31.97	1.8202	7 35 52.8	11.884	19	11 30 50.81	1.7973	2 13 15.7	12.395
20	10 6 21.13	1.8185	7 23 58.9	11.912	20	11 32 38.68	1.7983	2 25 39.3	12.389
21	10 8 10.19	1.8168	7 12 3.4	11.938	21	11 34 26.60	1.7992	2 38 2.4	12.381
22	10 9 59.14	1.8151	7 0 6.3	11.964	22	11 36 14.58	1.8002	2 50 25.0	12.373
23	10 11 48.00	1.8136	+ 6 48 7.7	-11.989	23	11 38 2.62	1.8013	-3 2 47.2	-12.366
AUGUST 18.					AUGUST 20.				
0	10 13 36.77	1.8121	+ 6 36 7.6	-12.013	0	11 39 50.73	1.8024	3 15 8.9	-12.357
1	10 15 25.45	1.8105	6 24 6.1	12.037	1	11 41 38.91	1.8035	3 27 30.0	12.347
2	10 17 14.03	1.8091	6 12 3.2	12.060	2	11 43 27.15	1.8048	3 39 50.5	12.336
3	10 19 2.54	1.8078	5 59 58.9	12.082	3	11 45 15.48	1.8061	3 52 10.3	12.325
4	10 20 50.96	1.8064	5 47 53.4	12.103	4	11 47 3.88	1.8074	4 4 29.5	12.313
5	10 22 39.31	1.8052	5 35 46.5	12.124	5	11 48 52.37	1.8089	4 16 47.9	12.300
6	10 24 27.58	1.8038	5 23 38.5	12.144	6	11 50 40.95	1.8103	4 29 5.5	12.287
7	10 26 15.77	1.8027	5 11 29.2	12.163	7	11 52 29.61	1.8119	4 41 22.3	12.273
8	10 28 3.90	1.8017	4 59 18.9	12.182	8	11 54 18.38	1.8135	4 53 38.2	12.258
9	10 29 51.97	1.8007	4 47 7.4	12.200	9	11 56 7.23	1.8151	5 5 53.2	12.243
10	10 31 39.98	1.7996	4 34 54.9	12.218	10	11 57 56.19	1.8169	5 18 7.3	12.227
11	10 33 27.92	1.7986	4 22 41.3	12.234	11	11 59 45.26	1.8187	5 30 20.4	12.209
12	10 35 15.81	1.7978	4 10 26.8	12.249	12	12 1 34.43	1.8204	5 42 32.4	12.192
13	10 37 3.65	1.7968	3 58 11.4	12.264	13	12 3 23.71	1.8223	5 54 43.4	12.173
14	10 38 51.43	1.7960	3 45 55.1	12.279	14	12 5 13.11	1.8243	6 6 53.2	12.154
15	10 40 39.17	1.7953	3 33 37.9	12.293	15	12 7 2.62	1.8263	6 19 1.9	12.134
16	10 42 26.87	1.7947	3 21 19.9	12.306	16	12 8 52.26	1.8283	6 31 9.3	12.113
17	10 44 14.53	1.7940	3 9 1.2	12.318	17	12 10 42.02	1.8305	6 43 15.5	12.093
18	10 46 2.15	1.7935	2 56 41.8	12.329	18	12 12 31.92	1.8327	6 55 20.4	12.071
19	10 47 49.75	1.7930	2 44 21.7	12.341	19	12 14 21.94	1.8348	7 7 24.0	12.048
20	10 49 37.31	1.7924	2 32 0.9	12.351	20	12 16 12.10	1.8372	7 19 26.2	12.024
21	10 51 24.84	1.7921	2 19 39.6	12.360	21	12 18 2.40	1.8395	7 31 26.9	12.000
22	10 53 12.36	1.7918	2 7 17.7	12.369	22	12 19 52.84	1.8419	7 43 26.2	11.975
23	10 54 59.85	1.7914	1 54 55.3	12.378	23	12 21 43.43	1.8444	7 55 23.9	11.949
24	10 56 47.33	1.7912	+ 1 42 32.4	-12.385	24	12 23 34.17	1.8469	-8 7 20.1	-11.923



MEAN TIME.







MEAN TIME.



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 14.					SEPTEMBER 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 2 39.91	1.8239	+7 46 24.1	-11.756	0	11 29 18.52	1.8066	- 1 58 39.3	-12.353
1	10 4 29.30	1.8223	7 34 37.9	11.784	1	11 31 6.95	1.8076	2 11 0.3	12.347
2	10 6 18.59	1.8208	7 22 50.0	11.812	2	11 32 55.43	1.8086	2 23 20.9	12.341
3	10 8 7.80	1.8193	7 11 0.5	11.840	3	11 34 43.98	1.8097	2 35 41.2	12.335
4	10 9 56.91	1.8178	6 59 9.2	11.868	4	11 36 32.59	1.8108	2 48 1.1	12.328
5	10 11 45.94	1.8165	6 47 16.4	11.893	5	11 38 21.27	1.8119	3 0 20.5	12.319
6	10 13 34.89	1.8152	6 35 22.1	11.918	6	11 40 10.02	1.8132	3 12 39.4	12.311
7	10 15 23.76	1.8138	6 23 26.3	11.943	7	11 41 58.85	1.8144	3 24 57.8	12.302
8	10 17 12.55	1.8127	6 11 28.9	11.968	8	11 43 47.75	1.8158	3 37 15.6	12.292
9	10 19 1.28	1.8115	5 59 30.2	11.990	9	11 45 36.74	1.8172	3 49 32.8	12.281
10	10 20 49.93	1.8103	5 47 30.1	12.013	10	11 47 25.81	1.8186	4 1 49.3	12.269
11	10 22 38.51	1.8092	5 35 28.6	12.035	11	11 49 14.97	1.8200	4 14 5.1	12.257
12	10 24 27.03	1.8082	5 23 25.9	12.056	12	11 51 4.21	1.8215	4 26 20.1	12.243
13	10 26 15.49	1.8073	5 11 21.9	12.077	13	11 52 53.55	1.8233	4 38 34.3	12.230
14	10 28 3.90	1.8063	4 59 16.7	12.096	14	11 54 43.00	1.8249	4 50 47.7	12.216
15	10 29 52.25	1.8054	4 47 10.4	12.115	15	11 56 32.54	1.8265	5 3 0.2	12.200
16	10 31 40.55	1.8046	4 35 2.9	12.134	16	11 58 22.18	1.8283	5 15 11.7	12.184
17	10 33 28.80	1.8038	4 22 54.3	12.152	17	12 0 11.94	1.8302	5 27 22.3	12.168
18	10 35 17.01	1.8031	4 10 44.7	12.169	18	12 2 1.80	1.8320	5 39 31.8	12.149
19	10 37 5.17	1.8024	3 58 34.0	12.185	19	12 3 51.78	1.8339	5 51 40.2	12.132
20	10 38 53.30	1.8019	3 46 22.5	12.200	20	12 5 41.87	1.8358	6 3 47.6	12.113
21	10 40 41.40	1.8013	3 34 10.0	12.216	21	12 7 32.08	1.8379	6 15 53.7	12.092
22	10 42 29.46	1.8008	3 21 56.6	12.230	22	12 9 22.42	1.8400	6 27 58.6	12.072
23	10 44 17.50	1.8003	+3 9 42.4	-12.243	23	12 11 12.88	1.8421	- 6 40 2.3	-12.050
SEPTEMBER 15.					SEPTEMBER 17.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 46 5.50	1.7999	+2 57 27.4	-12.256	0	12 13 3.47	1.8443	- 6 52 4.6	-12.028
1	10 47 53.49	1.7996	2 45 11.7	12.268	1	12 14 54.20	1.8466	7 4 5.6	12.005
2	10 49 41.45	1.7993	2 32 55.3	12.279	2	12 16 45.06	1.8488	7 16 5.2	11.981
3	10 51 29.40	1.7991	2 20 38.2	12.291	3	12 18 36.06	1.8512	7 28 3.3	11.956
4	10 53 17.34	1.7989	2 8 20.4	12.301	4	12 20 27.20	1.8535	7 39 59.9	11.931
5	10 55 5.27	1.7988	1 56 2.1	12.309	5	12 22 18.48	1.8560	7 51 55.0	11.905
6	10 56 53.20	1.7988	1 43 43.3	12.318	6	12 24 9.92	1.8585	8 3 48.5	11.878
7	10 58 41.12	1.7988	1 31 24.0	12.326	7	12 26 1.50	1.8610	8 15 40.3	11.850
8	11 0 29.05	1.7988	1 19 4.2	12.333	8	12 27 53.24	1.8637	8 27 30.5	11.822
9	11 2 16.97	1.7988	1 6 44.0	12.340	9	12 29 45.14	1.8663	8 39 18.9	11.792
10	11 4 4.91	1.7990	0 54 23.4	12.346	10	12 31 37.20	1.8689	8 51 5.5	11.761
11	11 5 52.85	1.7992	0 42 2.5	12.350	11	12 33 29.41	1.8717	9 2 50.2	11.730
12	11 7 40.81	1.7994	0 29 41.4	12.354	12	12 35 21.80	1.8746	9 14 33.1	11.699
13	11 9 28.78	1.7998	0 17 20.0	12.358	13	12 37 14.36	1.8774	9 26 14.1	11.667
14	11 11 16.78	1.8002	+0 4 58.4	12.362	14	12 39 7.09	1.8803	9 37 53.1	11.633
15	11 13 4.80	1.8005	-0 7 23.4	12.364	15	12 40 59.99	1.8833	9 49 30.0	11.598
16	11 14 52.84	1.8009	0 19 45.3	12.366	16	12 42 53.08	1.8863	10 1 4.9	11.563
17	11 16 40.91	1.8015	0 32 7.3	12.367	17	12 44 46.34	1.8893	10 12 37.6	11.528
18	11 18 29.02	1.8021	0 44 29.3	12.366	18	12 46 39.79	1.8924	10 24 8.2	11.491
19	11 20 17.16	1.8027	0 56 51.2	12.365	19	12 48 33.43	1.8956	10 35 36.5	11.453
20	11 22 5.34	1.8034	1 9 13.1	12.364	20	12 50 27.26	1.8988	10 47 2.5	11.415
21	11 23 53.57	1.8042	1 21 34.9	12.363	21	12 52 21.29	1.9021	10 58 26.3	11.376
22	11 25 41.84	1.8049	1 33 56.6	12.359	22	12 54 15.51	1.9053	11 9 47.6	11.335
23	11 27 30.16	1.8057	1 46 18.0	12.356	23	12 56 9.92	1.9086	11 21 6.5	11.293
24	11 29 18.52	1.8066	-1 58 39.3	-12.353	24	12 58 4.54	1.9121	-11 32 22.8	-11.252

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 18.					SEPTEMBER 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 58 4.54	1.9121	-11 32 22.8	-11.252	0	14 34 32.85	2.1205	-19 27 11.0	-8.171
1	12 59 59.37	1.9155	11 43 36.7	11.209	1	14 36 40.23	2.1255	19 35 18.6	8.083
2	13 1 54.40	1.9189	11 54 47.9	11.165	2	14 38 47.91	2.1306	19 43 21.0	7.905
3	13 3 49.64	1.9225	12 5 56.5	11.122	3	14 40 55.90	2.1356	19 51 18.0	7.905
4	13 5 45.10	1.9261	12 17 2.5	11.077	4	14 43 4.18	2.1406	19 59 9.6	7.814
5	13 7 40.77	1.9296	12 28 5.7	11.030	5	14 45 12.77	2.1457	20 6 55.7	7.723
6	13 9 36.67	1.9334	12 39 6.1	10.983	6	14 47 21.66	2.1508	20 14 36.3	7.629
7	13 11 32.78	1.9371	12 50 3.6	10.935	7	14 49 30.86	2.1558	20 22 11.2	7.536
8	13 13 29.12	1.9408	13 0 58.3	10.886	8	14 51 40.35	2.1608	20 29 40.6	7.442
9	13 15 25.68	1.9447	13 11 49.9	10.836	9	14 53 50.15	2.1659	20 37 4.2	7.345
10	13 17 22.48	1.9485	13 22 38.6	10.786	10	14 56 0.26	2.1709	20 44 22.0	7.248
11	13 19 19.50	1.9523	13 33 24.2	10.734	11	14 58 10.66	2.1759	20 51 34.0	7.152
12	13 21 16.76	1.9563	13 44 6.7	10.682	12	15 0 21.37	2.1810	20 58 40.2	7.053
13	13 23 14.26	1.9603	13 54 46.0	10.628	13	15 2 32.38	2.1861	21 5 40.4	6.953
14	13 25 11.99	1.9643	14 5 22.1	10.575	14	15 4 43.70	2.1912	21 12 34.6	6.853
15	13 27 9.97	1.9683	14 15 55.0	10.520	15	15 6 55.32	2.1962	21 19 22.7	6.751
16	13 29 8.19	1.9724	14 26 24.5	10.463	16	15 9 7.24	2.2012	21 26 4.7	6.648
17	13 31 6.66	1.9766	14 36 50.6	10.406	17	15 11 19.46	2.2062	21 32 40.5	6.545
18	13 33 5.38	1.9808	14 47 13.2	10.348	18	15 13 31.98	2.2112	21 39 10.1	6.441
19	13 35 4.35	1.9849	14 57 32.4	10.290	19	15 15 44.80	2.2163	21 45 33.4	6.335
20	13 37 3.57	1.9892	15 7 48.0	10.230	20	15 17 57.93	2.2213	21 51 50.3	6.228
21	13 39 3.05	1.9935	15 18 0.0	10.169	21	15 20 11.35	2.2262	21 58 0.8	6.121
22	13 41 2.79	1.9978	15 28 8.3	10.108	22	15 22 25.07	2.2311	22 4 4.8	6.013
23	13 43 2.79	2.0022	-15 38 12.9	-10.045	23	15 24 39.08	2.2361	-22 10 2.3	-5.903
SEPTEMBER 19.					SEPTEMBER 21.				
0	13 45 3.05	2.0066	-15 48 13.7	-9.982	0	15 26 53.40	2.2411	-22 15 53.2	-5.793
1	13 47 3.58	2.0110	15 58 10.7	9.918	1	15 29 8.01	2.2459	22 21 37.5	5.682
2	13 49 4.37	2.0154	16 8 3.8	9.852	2	15 31 22.91	2.2508	22 27 15.0	5.569
3	13 51 5.43	2.0199	16 17 52.9	9.786	3	15 33 38.11	2.2557	22 32 45.8	5.457
4	13 53 6.76	2.0245	16 27 38.1	9.718	4	15 35 53.59	2.2605	22 38 9.8	5.343
5	13 55 8.37	2.0290	16 37 19.1	9.650	5	15 38 9.37	2.2653	22 43 26.9	5.227
6	13 57 10.24	2.0336	16 46 56.1	9.582	6	15 40 25.43	2.2701	22 48 37.0	5.111
7	13 59 12.40	2.0383	16 56 28.9	9.511	7	15 42 41.78	2.2749	22 53 40.2	4.994
8	14 1 14.83	2.0429	17 5 57.4	9.440	8	15 44 58.42	2.2796	22 58 36.3	4.877
9	14 3 17.55	2.0476	17 15 21.7	9.368	9	15 47 15.33	2.2843	23 3 25.4	4.758
10	14 5 20.54	2.0523	17 24 41.6	9.295	10	15 49 32.53	2.2889	23 8 7.3	4.638
11	14 7 23.82	2.0570	17 33 57.1	9.222	11	15 51 50.00	2.2935	23 12 41.9	4.518
12	14 9 27.38	2.0618	17 43 8.2	9.147	12	15 54 7.75	2.2981	23 17 9.4	4.397
13	14 11 31.23	2.0666	17 52 14.7	9.071	13	15 56 25.77	2.3027	23 21 29.5	4.274
14	14 13 35.37	2.0714	18 1 16.7	8.993	14	15 58 44.07	2.3072	23 25 42.3	4.151
15	14 15 39.80	2.0762	18 10 13.9	8.915	15	16 1 2.63	2.3116	23 29 47.6	4.027
16	14 17 44.51	2.0810	18 19 6.5	8.838	16	16 3 21.46	2.3161	23 33 45.5	3.903
17	14 19 49.52	2.0860	18 27 54.4	8.758	17	16 5 40.56	2.3204	23 37 35.9	3.777
18	14 21 54.83	2.0908	18 36 37.4	8.676	18	16 7 59.91	2.3247	23 41 18.7	3.650
19	14 24 0.42	2.0958	18 45 15.5	8.594	19	16 10 19.52	2.3290	23 44 53.9	3.523
20	14 26 6.32	2.1007	18 53 48.7	8.512	20	16 12 39.39	2.3333	23 48 21.4	3.394
21	14 28 12.50	2.1056	19 2 16.9	8.428	21	16 14 59.51	2.3374	23 51 41.2	3.265
22	14 30 18.99	2.1106	19 10 40.1	8.343	22	16 17 19.88	2.3415	23 54 53.2	3.135
23	14 32 25.77	2.1155	19 18 58.1	8.258	23	16 19 40.49	2.3456	23 57 57.4	3.005
24	14 34 32.85	2.1205	-19 27 11.0	-8.171	24	16 22 1.35	2.3497	-24 0 53.8	-2.874

MOON, 1917.  
GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 22.					SEPTEMBER 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 22 1.35	2.3497	-24 0 53.8	-2.874	0	18 18 7.19	2.4578	-23 36 12.1	+ 4.050
1	16 24 22.45	2.3536	24 3 42.3	2.742	1	18 20 34.67	2.4581	23 32 4.6	4.199
2	16 26 43.78	2.3574	24 6 22.8	2.608	2	18 23 2.16	2.4582	23 27 48.2	4.348
3	16 29 5.34	2.3613	24 8 55.3	2.475	3	18 25 29.65	2.4583	23 23 22.8	4.498
4	16 31 27.14	2.3651	24 11 19.8	2.341	4	18 27 57.16	2.4584	23 18 48.4	4.648
5	16 33 49.15	2.3688	24 13 36.2	2.205	5	18 30 24.66	2.4583	23 14 5.0	4.797
6	16 36 11.39	2.3725	24 15 44.4	2.069	6	18 32 52.16	2.4583	23 9 12.8	4.945
7	16 38 33.85	2.3761	24 17 44.5	1.933	7	18 35 19.66	2.4581	23 4 11.6	5.094
8	16 40 56.52	2.3796	24 19 36.4	1.797	8	18 37 47.13	2.4578	22 59 1.5	5.243
9	16 43 19.40	2.3831	24 21 20.1	1.658	9	18 40 14.59	2.4575	22 53 42.5	5.391
10	16 45 42.49	2.3865	24 22 55.4	1.519	10	18 42 42.03	2.4571	22 48 14.6	5.538
11	16 48 5.78	2.3898	24 24 22.4	1.381	11	18 45 9.44	2.4566	22 42 37.9	5.686
12	16 50 29.26	2.3930	24 25 41.1	1.242	12	18 47 36.82	2.4560	22 36 52.3	5.833
13	16 52 52.94	2.3963	24 26 51.4	1.101	13	18 50 4.16	2.4554	22 30 57.9	5.979
14	16 55 16.81	2.3993	24 27 53.2	0.960	14	18 52 31.47	2.4548	22 24 54.8	6.125
15	16 57 40.86	2.4023	24 28 46.6	0.819	15	18 54 58.73	2.4540	22 18 42.9	6.272
16	17 0 5.09	2.4053	24 29 31.5	0.677	16	18 57 25.95	2.4532	22 12 22.2	6.418
17	17 2 29.50	2.4083	24 30 7.8	0.533	17	18 59 53.11	2.4523	22 5 52.8	6.563
18	17 4 54.08	2.4111	24 30 35.5	0.391	18	19 2 20.22	2.4513	21 59 14.7	6.707
19	17 7 18.83	2.4138	24 30 54.7	0.248	19	19 4 47.27	2.4503	21 52 28.0	6.851
20	17 9 43.73	2.4164	24 31 5.2	-0.103	20	19 7 14.26	2.4493	21 45 32.6	6.994
21	17 12 8.80	2.4191	24 31 7.1	+0.041	21	19 9 41.18	2.4482	21 38 28.7	7.138
22	17 14 34.02	2.4215	24 31 0.3	0.187	22	19 12 8.04	2.4470	21 31 16.1	7.280
23	17 16 59.38	2.4239	-24 30 44.7	+0.332	23	19 14 34.82	2.4457	-21 23 55.1	+ 7.422
SEPTEMBER 23.					SEPTEMBER 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 19 24.89	2.4263	-24 30 20.5	+0.477	0	19 17 1.52	2.4443	-21 16 25.5	+ 7.563
1	17 21 50.54	2.4286	24 29 47.5	0.623	1	19 19 28.14	2.4430	21 8 47.5	7.703
2	17 24 16.32	2.4308	24 29 5.7	0.770	2	19 21 54.68	2.4417	21 1 1.1	7.843
3	17 26 42.23	2.4328	24 28 15.1	0.917	3	19 24 21.14	2.4403	20 53 6.3	7.983
4	17 29 8.26	2.4348	24 27 15.7	1.064	4	19 26 47.51	2.4387	20 45 3.1	8.122
5	17 31 34.41	2.4368	24 26 7.4	1.212	5	19 29 13.78	2.4371	20 36 51.7	8.259
6	17 34 0.68	2.4387	24 24 50.3	1.359	6	19 31 39.96	2.4356	20 28 32.0	8.397
7	17 36 27.05	2.4404	24 23 24.3	1.508	7	19 34 6.05	2.4339	20 20 4.1	8.533
8	17 38 53.53	2.4422	24 21 49.4	1.657	8	19 36 32.03	2.4322	20 11 28.1	8.668
9	17 41 20.11	2.4438	24 20 5.5	1.805	9	19 38 57.91	2.4305	20 2 43.9	8.804
10	17 43 46.78	2.4453	24 18 12.8	1.953	10	19 41 23.69	2.4288	19 53 51.6	8.938
11	17 46 13.54	2.4467	24 16 11.1	2.103	11	19 43 49.36	2.4269	19 44 51.4	9.071
12	17 48 40.38	2.4480	24 14 0.5	2.252	12	19 46 14.92	2.4251	19 35 43.1	9.203
13	17 51 7.30	2.4493	24 11 40.9	2.402	13	19 48 40.37	2.4232	19 26 27.0	9.335
14	17 53 34.30	2.4505	24 9 12.3	2.551	14	19 51 5.70	2.4213	19 17 2.9	9.466
15	17 56 1.36	2.4516	24 6 34.8	2.701	15	19 53 30.92	2.4194	19 7 31.1	9.595
16	17 58 28.49	2.4526	24 3 48.2	2.851	16	19 55 56.03	2.4174	18 57 51.5	9.723
17	18 0 55.67	2.4535	24 0 52.7	3.001	17	19 58 21.01	2.4154	18 48 4.3	9.851
18	18 3 22.91	2.4544	23 57 48.1	3.151	18	20 0 45.88	2.4134	18 38 9.4	9.978
19	18 5 50.20	2.4552	23 54 34.6	3.300	19	20 3 10.62	2.4113	18 28 6.9	10.105
20	18 8 17.53	2.4558	23 51 12.1	3.450	20	20 5 35.24	2.4093	18 17 56.8	10.230
21	18 10 44.90	2.4564	23 47 40.6	3.600	21	20 7 59.73	2.4072	18 7 39.3	10.353
22	18 13 12.30	2.4570	23 44 0.1	3.750	22	20 10 24.10	2.4052	17 57 14.4	10.476
23	18 15 39.74	2.4574	23 40 10.6	3.900	23	20 12 48.35	2.4030	17 46 42.2	10.598
24	18 18 7.19	2.4578	-23 36 12.1	+4.050	24	20 15 12.46	2.4008	-17 36 2.7	+10.718

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MOON, 1917.  
GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 8.					OCTOBER 10.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 30 8.33	2.1018	+20 27 6.4	- 7.165	0	9 5 48.49	1.8986	+13 16 42.2	-10.455
1	7 32 14.29	2.0969	20 19 53.8	7.253	1	9 7 42.31	1.8954	13 6 13.4	10.504
2	7 34 19.96	2.0920	20 12 36.0	7.341	2	9 9 35.94	1.8923	12 55 41.7	10.553
3	7 36 25.33	2.0870	20 5 12.9	7.428	3	9 11 29.38	1.8891	12 45 7.0	10.602
4	7 38 30.40	2.0822	19 57 44.7	7.513	4	9 13 22.63	1.8860	12 34 29.5	10.648
5	7 40 35.19	2.0773	19 50 11.4	7.598	5	9 15 15.70	1.8831	12 23 49.2	10.695
6	7 42 39.67	2.0723	19 42 33.0	7.683	6	9 17 8.60	1.8802	12 13 6.1	10.741
7	7 44 43.87	2.0676	19 34 49.5	7.765	7	9 19 1.32	1.8773	12 2 20.3	10.786
8	7 46 47.78	2.0627	19 27 1.2	7.847	8	9 20 53.87	1.8744	11 51 31.8	10.831
9	7 48 51.39	2.0578	19 19 7.9	7.928	9	9 22 46.25	1.8716	11 40 40.6	10.874
10	7 50 54.72	2.0532	19 11 9.8	8.008	10	9 24 38.46	1.8688	11 29 46.9	10.918
11	7 52 57.77	2.0484	19 3 6.9	8.088	11	9 26 30.51	1.8662	11 18 50.5	10.960
12	7 55 0.53	2.0437	18 54 59.2	8.167	12	9 28 22.40	1.8635	11 7 51.7	11.001
13	7 57 3.01	2.0390	18 46 46.9	8.245	13	9 30 14.13	1.8609	10 56 50.4	11.042
14	7 59 5.21	2.0343	18 38 29.8	8.323	14	9 32 5.71	1.8584	10 45 46.7	11.082
15	8 1 7.13	2.0297	18 30 8.2	8.398	15	9 33 57.14	1.8560	10 34 40.6	11.122
16	8 3 8.77	2.0250	18 21 42.1	8.473	16	9 35 48.43	1.8536	10 23 32.1	11.161
17	8 5 10.13	2.0205	18 13 11.5	8.548	17	9 37 39.57	1.8512	10 12 21.3	11.198
18	8 7 11.23	2.0160	18 4 36.4	8.622	18	9 39 30.57	1.8489	10 1 8.3	11.236
19	8 9 12.05	2.0115	17 55 56.9	8.693	19	9 41 21.44	1.8467	9 49 53.0	11.273
20	8 11 12.61	2.0071	17 47 13.2	8.765	20	9 43 12.17	1.8444	9 38 35.5	11.310
21	8 13 12.90	2.0026	17 38 25.1	8.838	21	9 45 2.77	1.8423	9 27 15.8	11.345
22	8 15 12.92	1.9982	17 29 32.7	8.908	22	9 46 53.25	1.8403	9 15 54.1	11.380
23	8 17 12.68	1.9938	+17 20 36.2	- 8.976	23	9 48 43.60	1.8382	+ 9 4 30.2	-11.414
OCTOBER 9.					OCTOBER 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 19 12.18	1.9895	+17 11 35.6	- 9.044	0	9 50 33.83	1.8363	+ 8 53 4.4	-11.447
1	8 21 11.42	1.9853	17 2 30.9	9.113	1	9 52 23.95	1.8343	8 41 36.6	11.480
2	8 23 10.41	1.9810	16 53 22.1	9.180	2	9 54 13.95	1.8324	8 30 6.8	11.513
3	8 25 9.14	1.9768	16 44 9.3	9.246	3	9 56 3.84	1.8306	8 18 35.1	11.544
4	8 27 7.62	1.9726	16 34 52.6	9.311	4	9 57 53.62	1.8288	8 7 1.5	11.575
5	8 29 5.85	1.9685	16 25 32.0	9.376	5	9 59 43.30	1.8272	7 55 26.1	11.604
6	8 31 3.84	1.9644	16 16 7.5	9.439	6	10 1 32.88	1.8256	7 43 49.0	11.634
7	8 33 1.58	1.9603	16 6 39.3	9.502	7	10 3 22.37	1.8240	7 32 10.0	11.663
8	8 34 59.08	1.9564	15 57 7.3	9.565	8	10 5 11.76	1.8224	7 20 29.4	11.691
9	8 36 56.35	1.9524	15 47 31.5	9.626	9	10 7 1.06	1.8210	7 8 47.1	11.719
10	8 38 53.37	1.9485	15 37 52.2	9.686	10	10 8 50.28	1.8196	6 57 3.1	11.746
11	8 40 50.17	1.9447	15 28 9.2	9.747	11	10 10 39.41	1.8182	6 45 17.6	11.772
12	8 42 46.73	1.9408	15 18 22.6	9.806	12	10 12 28.46	1.8169	6 33 30.5	11.798
13	8 44 43.06	1.9370	15 8 32.5	9.863	13	10 14 17.44	1.8157	6 21 41.9	11.823
14	8 46 39.17	1.9333	14 58 39.0	9.921	14	10 16 6.34	1.8145	6 9 51.8	11.847
15	8 48 35.06	1.9297	14 48 42.0	9.978	15	10 17 55.18	1.8133	5 58 0.3	11.870
16	8 50 30.73	1.9260	14 38 41.6	10.034	16	10 19 43.94	1.8123	5 46 7.4	11.893
17	8 52 26.18	1.9223	14 28 37.9	10.089	17	10 21 32.65	1.8113	5 34 13.2	11.915
18	8 54 21.41	1.9188	14 18 30.9	10.143	18	10 23 21.30	1.8103	5 22 17.6	11.938
19	8 56 16.44	1.9153	14 8 20.7	10.198	19	10 25 9.89	1.8094	5 10 20.7	11.958
20	8 58 11.25	1.9119	13 58 7.2	10.251	20	10 26 58.43	1.8085	4 58 22.7	11.978
21	9 0 5.87	1.9085	13 47 50.6	10.303	21	10 28 46.91	1.8078	4 46 23.4	11.998
22	9 2 0.27	1.9051	13 37 30.8	10.355	22	10 30 35.36	1.8071	4 34 22.9	12.018
23	9 3 54.48	1.9018	13 27 8.0	10.405	23	10 32 23.76	1.8063	4 22 21.3	12.035
24	9 5 48.49	1.8986	+13 16 42.2	-10.455	24	10 34 12.12	1.8058	+ 4 10 18.7	-12.053

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 12.					OCTOBER 14.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 34 12.12	1.8058	+4 10 18.7	-12.053	0	12 1 15.64	1.8434	- 5 35 48.6	-12.100
1	10 36 0.45	1.8053	3 58 15.0	12.070	1	12 3 6.31	1.8457	5 47 54.1	12.083
2	10 37 48.75	1.8047	3 46 10.3	12.086	2	12 4 57.12	1.8479	5 59 58.6	12.065
3	10 39 37.01	1.8043	3 34 4.7	12.102	3	12 6 48.06	1.8501	6 12 1.9	12.047
4	10 41 25.26	1.8039	3 21 58.1	12.118	4	12 8 39.13	1.8524	6 24 4.2	12.028
5	10 43 13.48	1.8035	3 9 50.6	12.132	5	12 10 30.35	1.8548	6 36 5.3	12.008
6	10 45 1.68	1.8033	2 57 42.3	12.145	6	12 12 21.71	1.8573	6 48 5.2	11.987
7	10 46 49.87	1.8031	2 45 33.2	12.158	7	12 14 13.22	1.8598	7 0 3.7	11.965
8	10 48 38.05	1.8029	2 33 23.3	12.171	8	12 16 4.88	1.8623	7 12 1.0	11.943
9	10 50 26.22	1.8028	2 21 12.7	12.183	9	12 17 56.69	1.8648	7 23 56.9	11.920
10	10 52 14.39	1.8028	2 9 1.4	12.194	10	12 19 48.66	1.8675	7 35 51.4	11.896
11	10 54 2.56	1.8028	1 56 49.4	12.204	11	12 21 40.79	1.8702	7 47 44.4	11.871
12	10 55 50.73	1.8029	1 44 36.9	12.213	12	12 23 33.08	1.8729	7 59 35.9	11.845
13	10 57 38.91	1.8030	1 32 23.8	12.223	13	12 25 25.54	1.8758	8 11 25.8	11.819
14	10 59 27.09	1.8032	1 20 10.2	12.232	14	12 27 18.17	1.8786	8 23 14.2	11.792
15	11 1 15.29	1.8035	1 7 56.0	12.239	15	12 29 10.97	1.8814	8 35 0.8	11.763
16	11 3 3.51	1.8038	0 55 41.5	12.246	16	12 31 3.94	1.8843	8 46 45.8	11.735
17	11 4 51.75	1.8042	0 43 26.5	12.253	17	12 32 57.09	1.8874	8 58 29.0	11.704
18	11 6 40.01	1.8045	0 31 11.2	12.258	18	12 34 50.43	1.8904	9 10 10.3	11.673
19	11 8 28.29	1.8050	0 18 55.5	12.263	19	12 36 43.94	1.8935	9 21 49.8	11.643
20	11 10 16.61	1.8056	+0 6 39.6	12.268	20	12 38 37.65	1.8968	9 33 27.4	11.610
21	11 12 4.96	1.8062	-0 5 36.6	12.271	21	12 40 31.55	1.8998	9 45 3.0	11.577
22	11 13 53.35	1.8068	0 17 52.9	12.274	22	12 42 25.63	1.9031	9 56 36.6	11.543
23	11 15 41.78	1.8075	-0 30 9.5	-12.277	23	12 44 19.92	1.9064	-10 8 8.1	-11.508
OCTOBER 13.					OCTOBER 15.				
0	11 17 30.25	1.8083	-0 42 26.1	-12.278	0	12 46 14.40	1.9098	-10 19 37.5	-11.472
1	11 19 18.77	1.8091	0 54 42.8	12.278	1	12 48 9.09	1.9132	10 31 4.7	11.435
2	11 21 7.34	1.8100	1 6 59.5	12.278	2	12 50 3.98	1.9165	10 42 29.7	11.398
3	11 22 55.97	1.8109	1 19 16.2	12.278	3	12 51 59.07	1.9200	10 53 52.4	11.359
4	11 24 44.65	1.8118	1 31 32.9	12.277	4	12 53 54.38	1.9236	11 5 12.8	11.319
5	11 26 33.39	1.8129	1 43 49.4	12.275	5	12 55 49.90	1.9271	11 16 30.7	11.278
6	11 28 22.20	1.8141	1 56 5.9	12.273	6	12 57 45.63	1.9307	11 27 46.2	11.238
7	11 30 11.08	1.8153	2 8 22.1	12.269	7	12 59 41.58	1.9344	11 38 59.2	11.196
8	11 32 0.03	1.8164	2 20 38.2	12.265	8	13 1 37.76	1.9381	11 50 9.7	11.153
9	11 33 49.05	1.8177	2 32 53.9	12.260	9	13 3 34.15	1.9418	12 1 17.5	11.108
10	11 35 38.15	1.8190	2 45 9.4	12.255	10	13 5 30.78	1.9457	12 12 22.7	11.063
11	11 37 27.33	1.8204	2 57 24.5	12.248	11	13 7 27.63	1.9494	12 23 25.1	11.017
12	11 39 16.60	1.8219	3 9 39.2	12.242	12	13 9 24.71	1.9533	12 34 24.7	10.970
13	11 41 5.96	1.8233	3 21 53.5	12.233	13	13 11 22.02	1.9572	12 45 21.5	10.923
14	11 42 55.40	1.8248	3 34 7.2	12.225	14	13 13 19.57	1.9612	12 56 15.4	10.874
15	11 44 44.94	1.8265	3 46 20.5	12.217	15	13 15 17.36	1.9653	13 7 6.4	10.824
16	11 46 34.58	1.8283	3 58 33.2	12.206	16	13 17 15.40	1.9693	13 17 54.3	10.773
17	11 48 24.33	1.8299	4 10 45.2	12.195	17	13 19 13.67	1.9733	13 28 39.2	10.723
18	11 50 14.17	1.8317	4 22 56.6	12.184	18	13 21 12.19	1.9774	13 39 21.0	10.670
19	11 52 4.13	1.8335	4 35 7.3	12.173	19	13 23 10.96	1.9815	13 49 59.6	10.617
20	11 53 54.19	1.8354	4 47 17.3	12.159	20	13 25 9.97	1.9858	14 0 35.0	10.562
21	11 55 44.38	1.8373	4 59 26.4	12.145	21	13 27 9.25	1.9900	14 11 7.0	10.506
22	11 57 34.67	1.8393	5 11 34.7	12.131	22	13 29 8.77	1.9942	14 21 35.7	10.450
23	11 59 25.10	1.8414	5 23 42.1	12.116	23	13 31 8.55	1.9985	14 32 1.0	10.393
24	12 1 15.64	1.8434	-5 35 48.6	-12.100	24	13 33 8.59	2.0028	-14 42 22.8	-10.334





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MEAN TIME.

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 25.					NOVEMBER 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 5 58.07	2.2720	+12 22 42.6	+12.712	0	2 59 3.30	2.4348	+20 43 36.9	+7.670
1	1 8 14.49	2.2755	12 35 23.1	12.638	1	3 1 29.47	2.4374	20 51 13.1	7.537
2	1 10 31.11	2.2788	12 47 59.2	12.563	2	3 3 55.79	2.4400	20 58 41.3	7.402
3	1 12 47.94	2.2822	13 0 30.7	12.487	3	3 6 22.27	2.4426	21 6 1.3	7.266
4	1 15 4.97	2.2856	13 12 57.6	12.409	4	3 8 48.90	2.4450	21 13 13.2	7.130
5	1 17 22.21	2.2891	13 25 19.8	12.330	5	3 11 15.67	2.4473	21 20 16.9	6.993
6	1 19 39.66	2.2925	13 37 37.2	12.249	6	3 13 42.57	2.4496	21 27 12.4	6.855
7	1 21 57.31	2.2960	13 49 49.7	12.167	7	3 16 9.62	2.4518	21 33 59.5	6.716
8	1 24 15.18	2.2996	14 1 57.2	12.083	8	3 18 36.79	2.4539	21 40 38.3	6.577
9	1 26 33.26	2.3032	14 13 59.6	11.998	9	3 21 4.09	2.4560	21 47 8.7	6.437
10	1 28 51.56	2.3068	14 25 57.0	11.913	10	3 23 31.51	2.4579	21 53 30.7	6.295
11	1 31 10.07	2.3103	14 37 49.1	11.824	11	3 25 59.04	2.4598	21 59 44.1	6.153
12	1 33 28.79	2.3138	14 49 35.9	11.735	12	3 28 26.69	2.4618	22 5 49.1	6.012
13	1 35 47.73	2.3175	15 1 17.3	11.645	13	3 30 54.45	2.4634	22 11 45.5	5.868
14	1 38 6.89	2.3211	15 12 53.3	11.553	14	3 33 22.30	2.4651	22 17 33.3	5.724
15	1 40 26.26	2.3247	15 24 23.7	11.459	15	3 35 50.26	2.4667	22 23 12.4	5.580
16	1 42 45.85	2.3283	15 35 48.4	11.365	16	3 38 18.30	2.4680	22 28 42.9	5.436
17	1 45 5.66	2.3320	15 47 7.5	11.269	17	3 40 46.42	2.4694	22 34 4.7	5.291
18	1 47 25.69	2.3356	15 58 20.7	11.171	18	3 43 14.63	2.4708	22 39 17.8	5.144
19	1 49 45.93	2.3392	16 9 28.0	11.073	19	3 45 42.91	2.4718	22 44 22.0	4.998
20	1 52 6.39	2.3428	16 20 29.4	10.973	20	3 48 11.25	2.4729	22 49 17.5	4.852
21	1 54 27.07	2.3464	16 31 24.7	10.871	21	3 50 39.66	2.4739	22 54 4.2	4.704
22	1 56 47.96	2.3500	16 42 13.9	10.768	22	3 53 8.12	2.4748	22 58 42.0	4.557
23	1 59 9.07	2.3536	+16 52 56.9	+10.664	23	3 55 36.63	2.4756	+23 3 11.0	+4.408
NOVEMBER 26.					NOVEMBER 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 1 30.39	2.3572	+17 3 33.6	+10.558	0	3 58 5.19	2.4763	+23 7 31.0	+4.259
1	2 3 51.93	2.3608	17 14 3.9	10.452	1	4 0 33.79	2.4768	23 11 42.1	4.111
2	2 6 13.69	2.3644	17 24 27.8	10.344	2	4 3 2.41	2.4773	23 15 44.3	3.963
3	2 8 35.66	2.3679	17 34 45.2	10.235	3	4 5 31.07	2.4778	23 19 37.6	3.813
4	2 10 57.84	2.3714	17 44 56.0	10.124	4	4 7 59.74	2.4779	23 23 21.9	3.663
5	2 13 20.23	2.3749	17 55 0.1	10.013	5	4 10 28.42	2.4781	23 26 57.2	3.513
6	2 15 42.83	2.3784	18 4 57.5	9.899	6	4 12 57.11	2.4782	23 30 23.5	3.363
7	2 18 5.64	2.3819	18 14 48.0	9.785	7	4 15 25.80	2.4782	23 33 40.8	3.213
8	2 20 28.66	2.3854	18 24 31.7	9.670	8	4 17 54.49	2.4780	23 36 49.1	3.063
9	2 22 51.89	2.3888	18 34 8.4	9.553	9	4 20 23.16	2.4777	23 39 48.3	2.913
10	2 25 15.31	2.3921	18 43 38.0	9.435	10	4 22 51.81	2.4773	23 42 38.6	2.763
11	2 27 38.94	2.3955	18 53 0.6	9.317	11	4 25 20.44	2.4768	23 45 19.8	2.611
12	2 30 2.77	2.3988	19 2 16.0	9.196	12	4 27 49.03	2.4763	23 47 51.9	2.460
13	2 32 26.80	2.4021	19 11 24.1	9.075	13	4 30 17.59	2.4756	23 50 15.0	2.310
14	2 34 51.02	2.4053	19 20 25.0	8.953	14	4 32 46.10	2.4747	23 52 29.1	2.160
15	2 37 15.43	2.4084	19 29 18.4	8.828	15	4 35 14.55	2.4738	23 54 34.2	2.009
16	2 39 40.03	2.4115	19 38 4.4	8.704	16	4 37 42.95	2.4728	23 56 30.2	1.859
17	2 42 4.81	2.4147	19 46 42.9	8.578	17	4 40 11.28	2.4716	23 58 17.3	1.709
18	2 44 29.79	2.4178	19 55 13.8	8.452	18	4 42 39.54	2.4703	23 59 55.3	1.558
19	2 46 54.94	2.4207	20 3 37.1	8.324	19	4 45 7.72	2.4690	24 1 24.3	1.408
20	2 49 20.27	2.4236	20 11 52.7	8.196	20	4 47 35.82	2.4675	24 2 44.3	1.258
21	2 51 45.77	2.4265	20 20 0.5	8.065	21	4 50 3.82	2.4659	24 3 55.3	1.109
22	2 54 11.45	2.4293	20 28 0.5	7.935	22	4 52 31.73	2.4643	24 4 57.4	0.960
23	2 56 37.29	2.4321	20 35 52.7	7.803	23	4 54 59.53	2.4624	24 5 50.5	0.811
24	2 59 3.30	2.4348	+20 43 36.9	+ 7.670	24	4 57 27.22	2.4606	+24 6 34.7	+0.663

MEAN TIME.



## MEAN TIME.

## DECEMBER 7.

	h	m	s	"	"	"	"
0	11	32	11.62	1.8071	- 2 41	1.9	-12.000
1	11	34	0.08	1.8083	2 53	5.3	12.053
2	11	35	48.61	1.8095	3 5	8.3	12.046
3	11	37	37.22	1.8108	3 17	10.8	12.038
4	11	39	25.90	1.8121	3 29	12.8	12.029
5	11	41	14.67	1.8135	3 41	14.3	12.020
6	11	43	3.52	1.8149	3 53	15.2	12.009
7	11	44	52.46	1.8164	4 5	15.4	11.998
8	11	46	41.49	1.8181	4 17	15.0	11.988
9	11	48	10.03	1.8198	4 29	13.9	11.976
10	11	50	19.86	1.8215	4 41	12.1	11.963
11	11	52	9.21	1.8233	4 53	9.4	11.949
12	11	53	52.00	1.8252	5 5	6.0	11.936
13	11	55	48.23	1.8271	5 17	1.7	11.921
14	11	57	37.91	1.8291	5 28	56.5	11.906
15	11	59	27.72	1.8312	5 40	50.4	11.890
16	12	1	17.65	1.8333	5 52	43.3	11.873
17	12	3	7.71	1.8355	6 4	35.2	11.857
18	12	4	57.91	1.8378	6 16	26.1	11.839
19	12	6	48.24	1.8401	6 28	15.9	11.820
20	12	8	38.72	1.8425	6 40	4.5	11.801
21	12	10	29.34	1.8450	6 51	52.0	11.781
22	12	12	20.12	1.8475	7 3	38.2	11.760
23	12	14	11.04	1.8501	- 7 15	23.2	-11.739

## DECEMBER 8.

	h	m	s	"	"	"	"
0	12	16	2.13	1.8526	- 7 27	6.9	-11.718
1	12	17	53.38	1.8555	7 38	49.3	11.694
2	12	19	44.79	1.8583	7 50	30.2	11.671
3	12	21	36.38	1.8612	8 2	9.8	11.648
4	12	23	28.13	1.8640	8 13	47.9	11.623
5	12	25	20.04	1.8671	8 25	24.5	11.597
6	12	27	12.18	1.8702	8 36	59.5	11.570
7	12	29	4.41	1.8732	8 48	32.9	11.543
8	12	30	56.96	1.8764	9 0	4.6	11.515
9	12	32	49.65	1.8797	9 11	34.7	11.487
10	12	34	42.52	1.8829	9 23	3.0	11.457
11	12	36	35.60	1.8863	9 34	29.5	11.427
12	12	38	28.88	1.8898	9 45	54.2	11.396
13	12	40	22.37	1.8933	9 57	17.0	11.364
14	12	42	16.07	1.8968	10 8	37.9	11.332
15	12	44	9.99	1.9003	10 19	56.8	11.298
16	12	46	4.11	1.9041	10 31	13.7	11.265
17	12	47	58.47	1.9078	10 42	28.6	11.230
18	12	49	52.05	1.9116	10 53	41.3	11.194
19	12	51	47.88	1.9154	11 4	51.9	11.158
20	12	53	42.90	1.9194	11 16	0.2	11.121
21	12	55	38.19	1.9234	11 27	6.3	11.082
22	12	57	33.71	1.9273	11 38	10.0	11.043
23	12	59	29.47	1.9314	11 49	11.4	11.003
24	13	1	25.48	1.9356	-12 0	10.4	-10.963

## DECEMBER 9.

	h	m	s	"	"	"	"
0	13	1	25.48	1.9356	-12 0	10.4	-10.963
1	13	3	21.74	1.9398	12 11	6.9	10.921
2	13	5	18.26	1.9441	12 22	0.9	10.879
3	13	7	15.03	1.9483	12 32	52.4	10.836
4	13	9	12.06	1.9528	12 43	41.2	10.791
5	13	11	9.36	1.9573	12 54	27.3	10.746
6	13	13	6.93	1.9618	13 5	10.7	10.700
7	13	15	4.77	1.9663	13 15	51.3	10.653
8	13	17	2.89	1.9708	13 26	29.1	10.606
9	13	19	1.27	1.9755	13 37	3.9	10.556
10	13	20	59.94	1.9802	13 47	35.8	10.507
11	13	22	58.89	1.9849	13 58	4.7	10.456
12	13	24	58.13	1.9898	14 8	30.5	10.404
13	13	26	57.66	1.9946	14 18	53.2	10.352
14	13	28	57.48	1.9995	14 29	12.7	10.298
15	13	30	57.60	2.0044	14 39	29.0	10.243
16	13	32	58.01	2.0094	14 49	41.9	10.188
17	13	34	58.73	2.0144	14 59	51.5	10.132
18	13	36	59.74	2.0195	15 9	57.7	10.074
19	13	39	1.07	2.0246	15 20	0.4	10.015
20	13	41	2.71	2.0298	15 29	59.5	9.956
21	13	43	4.65	2.0350	15 39	55.1	9.896
22	13	45	6.91	2.0403	15 49	47.0	9.838
23	13	47	9.49	2.0457	-15 59	35.1	-9.771

## DECEMBER 10.

	h	m	s	"	"	"	"
0	13	49	12.39	2.0509	-16 9	19.5	-9.708
1	13	51	15.61	2.0563	16 19	0.0	9.643
2	13	53	19.15	2.0618	16 28	36.7	9.578
3	13	55	23.02	2.0673	16 38	9.3	9.510
4	13	57	27.22	2.0728	16 47	37.9	9.443
5	13	59	31.75	2.0783	16 57	2.4	9.373
6	14	1	36.61	2.0838	17 6	22.7	9.303
7	14	3	41.80	2.0893	17 15	38.8	9.233
8	14	5	47.33	2.0948	17 24	50.6	9.160
9	14	7	53.20	2.1003	17 33	58.0	9.087
10	14	9	59.41	2.1064	17 43	1.0	9.013
11	14	12	5.97	2.1121	17 51	59.5	8.937
12	14	14	12.86	2.1178	18 0	53.4	8.860
13	14	16	20.10	2.1235	18 9	42.7	8.783
14	14	18	27.68	2.1293	18 18	27.3	8.708
15	14	20	35.62	2.1352	18 27	7.1	8.623
16	14	22	43.90	2.1409	18 35	42.0	8.542
17	14	24	52.53	2.1468	18 44	12.1	8.460
18	14	27	1.51	2.1526	18 52	37.2	8.376
19	14	29	10.84	2.1585	19 0	57.2	8.291
20	14	31	20.53	2.1644	19 9	12.1	8.206
21	14	33	30.57	2.1703	19 17	21.9	8.119
22	14	35	40.96	2.1762	19 25	26.4	8.030
23	14	37	51.71	2.1821	19 33	25.5	7.941
24	14	40	2.81	2.1880	-19 41	19.3	-7.851



## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
DECEMBER 15.									DECEMBER 17.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	18	31	4.74	2.4967	-22	44	0.0	+ 5.063	0	20	27	45.64	2.3453	-16	5	9.4	+11.143
1	18	33	34.49	2.4951	22	38	51.8	5.211	1	20	30	6.24	2.3414	15	53	57.9	11.240
2	18	36	4.15	2.4935	22	33	34.7	5.359	2	20	32	26.61	2.3374	15	42	40.6	11.335
3	18	38	33.71	2.4917	22	28	8.7	5.507	3	20	34	46.73	2.3335	15	31	17.7	11.430
4	18	41	3.15	2.4898	22	22	33.9	5.653	4	20	37	6.63	2.3296	15	19	49.0	11.523
5	18	43	32.49	2.4879	22	16	50.4	5.798	5	20	39	26.28	2.3256	15	8	14.9	11.614
6	18	46	1.70	2.4858	22	10	58.1	5.944	6	20	41	45.70	2.3218	14	56	35.3	11.705
7	18	48	30.79	2.4838	22	4	57.1	6.088	7	20	44	4.89	2.3178	14	44	50.3	11.793
8	18	50	59.75	2.4816	21	58	47.5	6.232	8	20	46	23.84	2.3138	14	33	0.1	11.881
9	18	53	28.58	2.4793	21	52	29.3	6.375	9	20	48	42.55	2.3100	14	21	4.6	11.968
10	18	55	57.26	2.4768	21	46	2.5	6.518	10	20	51	1.04	2.3063	14	9	4.0	12.052
11	18	58	25.80	2.4744	21	39	27.2	6.659	11	20	53	19.30	2.3023	13	56	58.4	12.134
12	19	0	54.19	2.4718	21	32	43.4	6.800	12	20	55	37.32	2.2985	13	44	47.9	12.216
13	19	3	22.42	2.4692	21	25	51.2	6.939	13	20	57	55.12	2.2948	13	32	32.5	12.296
14	19	5	50.49	2.4665	21	18	50.7	7.078	14	21	0	12.69	2.2909	13	20	12.4	12.374
15	19	8	18.40	2.4638	21	11	41.9	7.216	15	21	2	30.03	2.2872	13	7	47.6	12.452
16	19	10	46.14	2.4608	21	4	24.8	7.353	16	21	4	47.15	2.2835	12	55	18.2	12.528
17	19	13	13.70	2.4579	20	56	59.5	7.489	17	21	7	4.05	2.2798	12	42	44.2	12.603
18	19	15	41.09	2.4550	20	49	26.1	7.624	18	21	9	20.73	2.2763	12	30	5.9	12.675
19	19	18	8.30	2.4520	20	41	44.6	7.758	19	21	11	37.20	2.2726	12	17	23.2	12.747
20	19	20	35.33	2.4488	20	33	55.1	7.892	20	21	13	53.44	2.2689	12	4	36.3	12.817
21	19	23	2.16	2.4457	20	25	57.6	8.024	21	21	16	9.47	2.2654	11	51	45.2	12.885
22	19	25	28.81	2.4425	20	17	52.2	8.155	22	21	18	25.29	2.2620	11	38	50.1	12.953
23	19	27	55.26	2.4392	-20	9	39.0	+ 8.284	23	21	20	40.91	2.2585	-11	25	50.9	+13.018
DECEMBER 16.									DECEMBER 18.								
0	19	30	21.51	2.4358	-20	1	18.1	+ 8.418	0	21	22	56.31	2.2550	-11	12	47.9	+13.082
1	19	32	47.56	2.4324	19	52	49.4	8.542	1	21	25	11.51	2.2517	10	59	41.1	13.145
2	19	35	13.40	2.4290	19	44	13.1	8.668	2	21	27	26.51	2.2483	10	46	30.5	13.207
3	19	37	39.04	2.4255	19	35	29.3	8.793	3	21	29	41.31	2.2450	10	33	16.3	13.266
4	19	40	4.46	2.4219	19	26	37.9	8.918	4	21	31	55.91	2.2418	10	19	58.6	13.324
5	19	42	29.67	2.4184	19	17	39.1	9.041	5	21	34	10.32	2.2385	10	6	37.4	13.382
6	19	44	54.67	2.4148	19	8	33.0	9.163	6	21	36	24.53	2.2353	9	53	12.8	13.438
7	19	47	19.44	2.4111	18	59	19.5	9.284	7	21	38	38.56	2.2323	9	39	44.9	13.491
8	19	49	44.00	2.4074	18	49	58.9	9.403	8	21	40	52.40	2.2292	9	26	13.9	13.543
9	19	52	8.33	2.4037	18	40	31.1	9.523	9	21	43	6.06	2.2262	9	12	39.7	13.595
10	19	54	32.44	2.3999	18	30	56.2	9.639	10	21	45	19.54	2.2232	8	59	2.5	13.644
11	19	56	56.32	2.3962	18	21	14.4	9.755	11	21	47	32.84	2.2203	8	45	22.4	13.693
12	19	59	19.98	2.3924	18	11	25.6	9.870	12	21	49	45.97	2.2174	8	31	39.4	13.739
13	20	1	43.41	2.3885	18	1	30.0	9.983	13	21	51	58.93	2.2146	8	17	53.7	13.785
14	20	4	6.60	2.3846	17	51	27.7	10.095	14	21	54	11.72	2.2118	8	4	5.2	13.829
15	20	6	29.56	2.3808	17	41	18.6	10.206	15	21	56	24.35	2.2092	7	50	14.2	13.871
16	20	8	52.29	2.3769	17	31	3.0	10.315	16	21	58	36.82	2.2065	7	36	20.7	13.913
17	20	11	14.79	2.3730	17	20	40.8	10.423	17	22	0	49.13	2.2039	7	22	24.7	13.953
18	20	13	37.05	2.3690	17	10	12.2	10.530	18	22	3	1.29	2.2014	7	8	26.4	13.990
19	20	15	59.07	2.3651	16	59	37.2	10.636	19	22	5	13.30	2.1989	6	54	25.9	14.027
20	20	18	20.86	2.3612	16	48	55.9	10.740	20	22	7	25.16	2.1965	6	40	23.2	14.063
21	20	20	42.41	2.3573	16	38	8.4	10.843	21	22	9	36.88	2.1943	6	26	18.4	14.097
22	20	23	3.73	2.3533	16	27	14.7	10.945	22	22	11	48.47	2.1919	6	12	11.6	14.129
23	20	25	24.80	2.3493	16	16	15.0	11.044	23	22	13	59.91	2.1897	5	58	2.9	14.161
24	20	27	45.64	2.3453	-16	5	9.4	+11.143	24	22	16	11.23	2.1876	-5	43	52.3	+14.194



Hour.
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0	22
1	22
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MOON, 1917.  
GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 31.					DECEMBER 31.				
	<b>h m s</b>	<b>s</b>	<b>° ' "</b>	<b>"</b>		<b>h m s</b>	<b>s</b>	<b>° ' "</b>	<b>"</b>
0	9 4 24.27	1.9496	+12 57 41.7	-10.678	12	9 27 30.92	1.9034	+10 46 25.8	-11.178
1	9 6 21.12	1.9455	12 46 59.6	10.725	13	9 29 25.02	1.8999	10 35 14.0	11.214
2	9 8 17.73	1.9414	12 36 14.7	10.770	14	9 31 18.91	1.8964	10 24 0.1	11.249
3	9 10 14.09	1.9373	12 25 27.2	10.815	15	9 33 12.59	1.8931	10 12 44.1	11.283
4	9 12 10.21	1.9334	12 14 36.9	10.859	16	9 35 6.08	1.8898	10 1 26.1	11.318
5	9 14 6.10	1.9295	12 3 44.1	10.902	17	9 36 59.36	1.8863	9 50 6.0	11.351
6	9 16 1.75	1.9256	11 52 48.7	10.943	18	9 38 52.44	1.8832	9 38 44.0	11.383
7	9 17 57.17	1.9218	11 41 50.9	10.985	19	9 40 45.34	1.8800	9 27 20.1	11.414
8	9 19 52.36	1.9180	11 30 50.5	11.026	20	9 42 38.04	1.8768	9 15 54.3	11.444
9	9 21 47.33	1.9143	11 19 47.8	11.065	21	9 44 30.56	1.8738	9 4 26.8	11.474
10	9 23 42.08	1.9107	11 8 42.7	11.103	22	9 46 22.89	1.8707	8 52 57.4	11.503
11	9 25 36.61	1.9070	10 57 35.4	11.141	23	9 48 15.04	1.8678	8 41 26.4	11.531
12	9 27 30.92	1.9034	+10 46 25.8	-11.178	24	9 50 7.02	1.8648	+ 8 29 53.7	-11.558

PHASES OF THE MOON.

○ Full Moon	Jan.	d h m	7 19 42.0	Apr.	d h m	7 1 48.8	July	d h m	4 9 40.5	Sept.	d h m	30 8 31.1
☾ Last Quarter			15 23 42.1			14 8 12.0			11 0 11.9	Oct.		7 10 14.3
● New Moon			22 19 40.0			21 2 1.3			18 15 0.1			15 14 41.0
☾ First Quarter			29 13 1.5			28 17 22.0			26 18 40.4			23 2 37.7
○ Full Moon	Feb.		6 15 28.4	May		6 14 43.3	Aug.		2 17 10.9			29 18 19.2
☾ Last Quarter			14 13 53.2			13 13 47.9			9 7 56.4	Nov.		6 5 3.5
● New Moon			21 6 9.0			20 12 46.8			17 6 21.0			14 6 28.5
☾ First Quarter			28 4 43.7			28 11 33.5			25 7 8.2			21 10 28.8
○ Full Moon	Mar.		8 9 58.0	June		5 1 6.7	Sept.		1 0 28.5			28 6 41.3
☾ Last Quarter			16 0 33.1			11 18 38.5			7 19 5.2	Dec.		6 2 13.8
● New Moon			22 16 5.0			19 1 2.2			15 22 27.5			13 21 17.3
☾ First Quarter			29 22 36.4			27 4 8.4			23 17 41.4			20 18 7.3
○ Full Moon	Apr.		7 1 48.8	July		4 9 40.5			30 8 31.1			27 21 51.6
☾ Last Quarter			14 8 12.0			11 0 11.9	Oct.		7 10 14.3			

APOGEE.

PERIGEE.

January	d h	9 20.4	July	d h	21 17.6	January	d h	23 0.6	August	d h	3 9.9
February		5 20.7	August		18 0.5	February		20 13.3	August		31 19.9
March		5 2.9	September		14 2.7	March		20 21.2	September		29 6.1
April		1 19.2	October		11 12.5	April		17 15.2	October		27 10.8
April		29 14.2	November		8 5.4	May		13 6.6	November		23 18.5
May		27 9.4	December		6 2.3	June		8 8.2	December		18 10.2
June		24 3.1				July		6 3.6			



## GREENWICH MEAN TIME.

Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
"	d			h m	m
-0.628	1.2	Jan. 24	U	1 19.0	2.80
1.210	1.7	24	L	13 46.2	2.23
1.548	2.2	25	U	2 12.6	2.17
1.630	2.7	25	L	14 38.4	2.12
2.052	3.2	26	U	3 3.6	2.09
-2.213	3.7	26	L	15 28.6	2.06
2.314	4.2	27	U	3 53.2	2.05
2.360	4.7	27	L	16 17.8	2.06
2.356	5.2	28	U	4 42.4	2.06
2.306	5.7	28	L	17 7.2	2.07
-2.224	6.2	29	U	5 32.1	2.09
1.978	6.7	29	L	17 57.3	2.11
1.978	7.2	30	U	6 22.8	2.13
1.628	7.7	30	L	18 48.5	2.13
1.660	8.2	31	U	7 14.4	2.15
-1.504	8.7	31	L	19 40.3	2.17
1.172	9.2	Feb. 1	U	8 6.3	2.16
1.011	9.7	1	L	20 32.2	2.14
0.857	10.2	2	U	8 57.8	2.11
-0.700	10.7	2	L	21 23.1	2.09
0.565	11.2	3	U	9 48.0	2.05
0.436	11.7	3	L	22 12.3	2.00
0.191	12.2	4	U	10 36.1	1.96
-0.079	12.7	4	L	22 59.2	1.91
+0.030	13.2	5	U	11 21.8	1.86
0.135	13.7	5	L	23 43.8	1.80
0.238	14.2	6	U	12 5.4	1.77
0.342	14.7			...	...
+0.448	15.2	7	L	0 26.4	1.74
0.555	15.7	7	U	12 47.2	1.71
0.665	16.2	8	L	1 7.6	1.66
0.785	16.7	8	U	13 27.9	1.60
0.908	17.2	9	L	1 48.1	1.60
+1.035	17.7	9	U	14 8.4	1.70
1.166	18.2	10	L	2 28.9	1.71
1.305	18.7	10	U	14 49.6	1.74
1.444	19.2	11	L	3 10.8	1.78
1.583	19.7	11	U	15 32.5	1.84
+1.719	20.2	12	L	3 55.0	1.90
1.847	20.7	12	U	16 18.2	1.97
1.978	21.2	13	L	4 42.3	2.05
2.062	21.7	13	U	17 7.4	2.14
2.137	22.2	14	L	5 33.6	2.23
+2.183	22.7	14	U	18 0.8	2.31
+2.191	23.2	15	L	6 29.1	2.40
	23.7	15	U	18 58.3	2.47
	24.2	16	L	7 28.3	2.54

**MOON, 1917.**  
**GREENWICH MEAN TIME.**

Transit, in of Greenwich.		Var. per Hour.
	h m	m
3	L 7 28.3	2.53
3	U 19 58.9	2.56
7	L 8 29.7	2.57
7	U 21 0.5	2.56
3	L 9 31.1	2.53
3	U 22 1.3	2.49
9	L 10 30.8	2.43
9	U 22 59.6	2.37
9	L 11 27.7	2.31
9	U 23 55.1	2.26
. . . . .		. . .
1	L 12 22.0	2.21
2	U 0 48.3	2.18
2	L 13 14.3	2.15
3	U 1 40.0	2.13
3	L 14 5.6	2.13
1	U 2 31.1	2.13
1	L 14 56.7	2.14
3	U 3 22.5	2.15
5	L 15 48.4	2.17
3	U 4 14.5	2.19
3	L 16 40.9	2.20
7	U 5 7.3	2.21
7	L 17 33.9	2.21
3	U 6 0.3	2.20
3	L 18 26.7	2.19
1	U 6 52.8	2.16
1	L 19 18.5	2.12
2	U 7 43.7	2.08
2	L 20 8.4	2.03
3	U 8 32.6	1.98
3	L 20 56.1	1.93
1	U 9 19.0	1.88
1	L 21 41.4	1.84
5	U 10 3.2	1.80
5	L 22 24.6	1.77
3	U 10 45.8	1.74
3	L 23 6.3	1.73
7	U 11 26.8	1.70
7	L 23 47.2	1.70
3	U 12 7.7	1.71
. . . . .		. . .
9	L 0 28.2	1.72
9	U 12 49.0	1.74
9	L 1 10.1	1.78
9	U 13 31.7	1.82
1	L 1 53.9	1.87

## MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter	Horizontal Parallax.	Var. per Hour.
	" "	" "	" "	" "	m
Mar. 10.0	187 10 55.3	-4 58 15.3	15 2.3	55 5.49	1.75
10.5	193 23 32.5	5 2 31.4	15 5.6	55 17.70	1.82
11.0	199 38 46.4	5 3 11.7	15 9.1	55 30.76	1.87
11.5	205 56 42.1	5 0 11.4	15 12.9	55 44.67	1.93
12.0	212 17 25.3	4 53 28.0	15 17.0	55 59.45	2.00
12.5	218 41 3.4	-4 43 1.4	15 21.2	56 15.05	2.07
13.0	225 7 44.6	4 28 53.9	15 25.7	56 31.53	2.15
13.5	231 37 38.7	4 11 11.0	15 30.4	56 48.85	2.23
14.0	238 10 57.0	3 50 0.4	15 35.4	57 6.97	2.30
14.5	244 47 52.3	3 25 32.9	15 40.5	57 20.80	2.36
15.0	251 28 37.8	-2 58 2.4	15 45.8	57 45.25	2.41
15.5	258 13 26.9	2 27 46.0	15 51.2	58 5.16	2.45
16.0	265 2 32.4	1 55 4.2	15 56.7	58 25.32	2.47
16.5	271 56 5.4	1 20 20.5	16 2.2	58 45.44	2.47
17.0	278 54 14.0	0 44 2.4	16 7.6	59 5.20	2.46
17.5	285 57 2.1	-0 6 40.7	16 12.8	59 24.23	2.43
18.0	293 4 27.8	+0 31 10.3	16 17.6	59 42.09	2.38
18.5	300 16 22.3	1 8 53.5	16 22.0	59 58.28	2.33
19.0	307 32 28.4	1 45 49.4	16 25.9	60 12.32	2.29
19.5	314 52 20.0	2 21 17.2	16 29.0	60 25.72	2.26
20.0	322 15 21.1	+2 54 35.7	16 31.2	60 37.03	2.21
20.5	329 40 46.1	3 25 5.3	16 32.6	60 46.80	2.18
21.0	337 7 41.0	3 52 9.0	16 32.8	60 54.88	2.16
21.5	344 35 4.9	4 15 14.7	16 32.0	60 59.91	2.14
22.0	352 1 51.7	4 33 56.0	16 30.1	60 57.91	...
22.5	359 26 53.6	+4 47 54.0	16 27.1	60 46.98	2.14
23.0	6 49 3.4	4 56 57.5	16 23.2	60 27.32	2.15
23.5	14 7 18.3	5 1 3.0	16 18.2	59 44.31	2.16
24.0	21 20 42.0	5 0 15.1	16 12.6	59 21.43	2.18
24.5	28 28 27.2	4 54 45.0	16 6.2	59 0.16	2.21
25.0	35 29 57.1	+4 44 49.8	15 59.4	58 25.16	2.24
25.5	42 24 46.3	4 30 50.8	15 52.3	58 9.01	2.26
26.0	49 12 40.9	4 13 12.5	15 45.0	57 42.33	2.27
26.5	55 53 38.1	3 52 20.7	15 37.7	57 15.67	2.27
27.0	62 27 45.1	3 28 42.6	15 30.6	56 49.59	2.27
27.5	68 55 18.1	+3 2 44.5	15 23.8	56 24.54	2.26
28.0	75 16 40.8	2 34 52.3	15 17.4	56 0.92	2.23
28.5	81 32 23.0	2 5 30.5	15 11.4	55 39.07	2.20
29.0	87 42 59.3	1 35 2.3	15 6.0	55 19.28	2.15
29.5	93 49 7.5	1 3 49.5	15 1.2	55 1.70	2.10
30.0	99 51 27.9	+0 32 12.4	14 57.1	54 46.55	2.04
30.5	105 50 41.9	+0 0 29.9	14 53.6	54 33.20	1.98
31.0	111 47 31.5	-0 30 59.8	14 50.9	54 23.78	1.93
31.5	117 42 38.0	1 1 59.5	14 48.8	54 16.22	1.88
Apr. 1.0	123 36 41.9	1 32 12.4	14 47.5	54 11.18	1.83
1.5	129 30 22.1	-2 1 22.6	14 46.8	54 8.61	1.79
2.0	135 24 15.4	-2 29 13.9	14 46.7	54 8.39	1.76



MOON, 1917.  
GREENWICH MEAN TIME.

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G. M. T

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**GREENWICH MEAN TIME.**

## GREENWICH MEAN TIME.

G. M. T.		I
May	17.0	1
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	28.5	14
	29.0	14
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	30.5	15
	31.0	15
	31.5	15
June	1.0	20
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	3.5	21
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	6.0	21
	6.5	21
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	7.5	21
	8.0	21
	8.5	30
	9.0	31

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour.
	" ' "	" ' "	"	d		m
June 9.0	310 59 6.9	+2 38 33.8	-0.270	19.5	June 9	2.24
9.5	318 11 56.6	3 11 32.4	0.455	20.0	9	2.18
10.0	325 23 35.2	3 41 23.0	0.615	20.5	10	2.13
10.5	332 33 38.6	4 7 39.7	0.753	21.0	10	2.08
11.0	339 41 46.1	4 29 57.6	0.868	21.5	11	2.05
11.5	346 47 39.9	+4 48 0.2	-0.961	22.0	11	2.03
12.0	353 51 5.3	5 1 34.3	1.037	22.5	12	2.02
12.5	0 51 49.8	5 10 32.6	1.096	23.0	12	2.03
13.0	7 49 42.8	5 14 52.4	1.140	23.5	13	2.04
13.5	14 44 35.7	5 14 35.6	1.172	24.0	13	2.07
14.0	21 36 21.0	+5 9 48.5	-1.199	24.5	14	2.10
14.5	28 24 52.3	5 0 41.2	1.220	25.0	14	2.13
15.0	35 10 4.5	4 47 27.2	1.236	25.5	15	2.17
15.5	41 51 52.7	4 30 23.1	1.247	26.0	15	2.21
16.0	48 30 18.4	4 9 48.3	1.254	26.5	16	2.24
16.5	55 5 3.5	+3 46 4.2	-1.257	27.0	16	2.26
17.0	61 36 21.4	3 19 35.1	1.257	27.5	17	2.27
17.5	68 4 6.1	2 50 45.1	1.250	28.0	17	2.27
18.0	74 28 18.6	2 20 0.0	1.234	28.5	18	2.26
18.5	80 49 0.9	1 47 46.1	1.211	29.0	18	2.22
19.0	87 6 17.3	+1 14 29.2	-1.176	29.5		...
19.5	93 20 14.1	0 40 35.2	1.129	0.5	19	2.17
20.0	99 30 59.5	+0 6 28.7	1.069	1.0	20	2.11
20.5	105 38 44.4	-0 27 26.6	0.995	1.5	20	2.03
21.0	111 43 41.8	1 0 48.7	0.908	2.0	21	2.00
21.5	117 46 7.4	-1 33 16.2	-0.799	2.5	21	1.93
22.0	123 46 19.0	2 4 29.5	0.676	3.0	22	1.87
22.5	129 44 37.4	2 34 12.1	0.540	3.5	22	1.82
23.0	135 41 25.5	3 2 6.4	0.393	4.0	23	1.77
23.5	141 37 8.5	3 27 57.9	0.228	4.5	23	1.73
24.0	147 32 13.4	-3 51 33.0	-0.046	5.0	24	1.71
24.5	153 27 9.6	4 12 39.2	+0.144	5.5	24	1.69
25.0	159 22 27.8	4 31 4.6	0.341	6.0	25	1.68
25.5	165 18 40.6	4 46 39.1	0.544	6.5	25	1.66
26.0	171 16 21.1	4 59 12.0	0.755	7.0	26	1.66
26.5	177 16 3.2	-5 8 34.1	+0.966	7.5	26	1.71
27.0	183 18 21.5	5 14 36.2	1.171	8.0	27	1.75
27.5	189 23 50.2	5 17 11.0	1.373	8.5	27	1.79
28.0	195 33 2.4	5 16 10.0	1.566	9.0	28	1.80
28.5	201 46 30.0	5 11 27.2	1.743	9.5	28	1.80
29.0	208 4 43.0	-5 2 57.2	1.900	10.0	29	2.01
29.5	214 28 8.2	4 50 36.6	2.035	10.5	29	2.09
30.0	220 57 8.4	4 34 24.2	2.138	11.0	30	2.18
30.5	227 32 2.1	4 14 21.7	2.207	11.5	30	2.27
July 1.0	234 13 1.9	3 50 34.3	2.234	12.0	July 1	2.37
1.5	241 0 13.6	3 23 11.4	+2.215	12.5	1	2.46
2.0	247 53 36.3	-2 52 27.7	+2.148	13.0	2	2.53

GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		° ' "	° ' "	' "	' "	"	d			h m	m
July	1.0	234 13 1.9	-3 50 34.3	15 45.3	57 43.47	+2.234	12.0	July 1	U	9 8.0	2.37
	1.5	241 0 13.6	3 23 11.4	15 52.6	58 10.21	2.215	12.5	1	L	21 37.0	2.46
	2.0	247 53 36.3	2 52 27.7	15 59.7	58 36.44	2.148	13.0	2	U	10 6.9	2.52
	2.5	254 53 0.5	2 18 42.9	16 6.6	59 1.56	2.080	13.5	2	L	22 37.4	2.57
	3.0	261 58 8.7	1 42 22.6	16 13.0	59 24.97	1.863	14.0	3	U	11 8.4	2.59
	3.5	269 8 34.5	-1 3 58.5	16 18.7	59 46.07	+1.646	14.5	3	L	23 39.4	2.58
	4.0	276 23 44.0	-0 24 7.2	16 23.7	60 4.31	1.888	15.0	4	U	12 10.2	2.55
	4.5	283 42 55.3	+0 16 29.9	16 27.8	60 19.24	1.094	15.5			.....	....
	5.0	291 5 19.9	0 57 8.1	16 30.8	60 30.46	0.773	16.0	5	L	0 40.6	2.50
	5.5	298 30 4.6	1 37 0.8	16 32.8	60 37.75	0.440	16.5	5	U	13 10.5	2.44
	6.0	305 56 12.9	+2 15 21.6	16 33.7	60 40.99	+0.101	17.0	6	L	1 39.1	2.37
	6.5	313 22 46.9	2 51 25.9	16 33.5	60 40.20	-0.229	17.5	6	U	14 7.2	2.30
	7.0	320 48 49.2	3 24 32.5	16 32.2	60 35.56	0.539	18.0	7	L	2 34.5	2.24
	7.5	328 13 25.2	3 54 5.8	16 30.0	60 27.38	0.820	18.5	7	U	15 1.0	2.18
	8.0	335 35 44.5	4 19 35.9	16 26.9	60 16.02	1.068	19.0	8	L	3 26.9	2.13
	8.5	342 55 2.7	+4 40 40.0	16 23.1	60 1.92	-1.275	19.5	8	U	15 52.3	2.10
	9.0	350 10 41.8	4 57 2.4	16 18.6	59 45.59	1.442	20.0	9	L	4 17.3	2.08
	9.5	357 22 11.3	5 8 34.4	16 13.7	59 27.49	1.568	20.5	9	U	16 42.2	2.06
	10.0	4 29 8.3	5 15 13.6	16 8.4	59 8.12	1.654	21.0	10	L	5 6.9	2.06
	10.5	11 31 17.0	5 17 3.1	16 2.9	58 47.95	1.705	21.5	10	U	17 31.7	2.07
	11.0	18 28 28.5	+5 14 11.5	15 57.3	58 27.33	-1.726	22.0	11	L	5 56.7	2.09
	11.5	25 20 40.0	5 6 51.0	15 51.6	58 6.64	1.720	22.5	11	U	18 21.9	2.11
	12.0	32 7 53.5	4 55 17.3	15 46.1	57 46.15	1.692	23.0	12	L	6 47.5	2.14
	12.5	38 50 15.6	4 39 48.6	15 40.6	57 26.10	1.647	23.5	12	U	19 13.4	2.17
	13.0	45 27 56.4	4 20 45.3	15 35.3	57 6.67	1.591	24.0	13	L	7 39.6	2.20
	13.5	52 1 7.9	+3 58 29.2	15 30.2	56 47.97	-1.524	24.5	13	U	20 6.1	2.22
	14.0	58 30 4.3	3 33 23.1	15 25.3	56 30.11	1.454	25.0	14	L	8 32.9	2.24
	14.5	64 55 0.8	3 5 50.5	15 20.7	56 13.11	1.379	25.5	14	U	20 59.7	2.24
	15.0	71 16 12.8	2 36 15.6	15 16.3	55 57.02	1.303	26.0	15	L	9 26.6	2.23
	15.5	77 33 56.1	2 5 2.6	15 12.2	55 41.85	1.226	26.5	15	U	21 53.2	2.21
	16.0	83 48 26.2	+1 32 35.5	15 8.3	55 27.59	-1.150	27.0	16	L	10 19.5	2.18
	16.5	89 59 58.0	0 59 18.5	15 4.6	55 14.26	1.071	27.5	16	U	22 45.4	2.13
	17.0	96 8 46.2	+0 25 35.3	15 1.3	55 1.88	0.993	28.0	17	L	11 10.6	2.08
	17.5	102 15 5.1	-0 8 11.3	14 58.2	54 50.43	0.913	28.5	17	U	23 35.3	2.02
	18.0	108 19 8.4	0 41 38.8	14 55.3	54 39.99	0.829	29.0			.....	....
	18.5	114 21 9.8	-1 14 26.1	14 52.7	54 30.56	-0.742	29.5	18	L	11 59.2	1.97
	19.0	120 21 23.1	1 46 12.6	14 50.5	54 22.20	0.649	0.4	19	U	0 22.5	1.91
	19.5	126 20 2.5	2 16 39.4	14 48.5	54 15.00	0.549	0.9	19	L	12 45.1	1.85
	20.0	132 17 22.5	2 45 28.6	14 46.9	54 9.05	0.441	1.4	20	U	1 7.0	1.80
	20.5	138 13 38.5	3 12 23.8	14 45.6	54 4.44	0.325	1.9	20	L	13 28.4	1.76
	21.0	144 9 6.8	-3 37 9.7	14 44.8	54 1.29	-0.199	2.4	21	U	1 49.3	1.73
	21.5	150 4 5.1	3 59 32.7	14 44.3	53 59.71	-0.063	2.9	21	L	14 9.8	1.70
	22.0	155 58 52.5	4 19 20.5	14 44.4	53 59.83	+0.084	3.4	22	U	2 30.1	1.68
	22.5	161 53 49.6	4 36 21.8	14 44.9	54 1.78	0.243	3.9	22	L	14 50.2	1.67
	23.0	167 49 19.0	4 50 26.8	14 46.0	54 5.70	0.411	4.4	23	U	3 10.2	1.67
	23.5	173 45 44.6	-5 1 26.4	14 47.6	54 11.67	+0.587	4.9	23	L	15 30.3	1.68
	24.0	179 43 32.4	-5 9 13.3	14 49.8	54 19.81	+0.771	5.4	24	U	3 50.6	1.70

## GREENWICH MEAN TIME.

Var.  
per  
hour.

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**MOON, 1917.**  
**GREENWICH MEAN TIME.**

GREENWICH MEAN TIME.



MOON, 1917.  
GREENWICH MEAN TIME.

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" "	" "	" "	" "	" "	d			h m	m
Oct.	24.0	312 5 19.6	+3 9 35.3	16 10.0	59 14.06	+1.324	8.4	Oct. 24	U	7 0.1	2.18
	24.5	319 11 21.9	3 37 38.6	16 14.2	59 29.40	1.227	8.9	24	L	19 26.1	2.16
	25.0	326 21 34.6	4 2 32.9	16 18.0	59 43.39	1.098	9.4	25	U	7 51.9	2.14
	25.5	333 35 39.6	4 23 47.7	16 21.3	59 55.61	0.934	9.9	25	L	20 17.6	2.13
	26.0	340 53 10.1	4 40 55.7	16 24.1	60 5.67	0.735	10.4	26	U	8 43.2	2.13
	26.5	348 13 30.4	+4 53 33.4	16 26.1	60 13.14	+0.504	10.9	26	L	21 8.9	2.15
	27.0	355 35 56.0	5 1 22.4	16 27.3	60 17.67	+0.248	11.4	27	U	9 34.7	2.17
	27.5	2 59 34.4	5 4 11.1	16 27.7	60 18.99	-0.031	11.9	27	L	22 1.0	2.20
	28.0	10 23 27.9	5 1 54.6	16 27.1	60 16.86	0.325	12.4	28	U	10 27.6	2.24
	28.5	17 46 34.5	4 54 35.9	16 25.6	60 11.16	0.626	12.9	28	L	22 54.6	2.28
	29.0	25 7 51.0	+4 42 25.3	16 23.0	60 1.87	-0.919	13.4	29	U	11 22.3	2.32
	29.5	32 26 16.2	4 25 40.5	16 19.6	59 49.18	1.194	13.9	29	L	23 50.4	2.36
	30.0	39 40 53.3	4 4 45.4	16 15.2	59 33.30	1.447	14.4	30	U	12 18.9	2.39
	30.5	46 50 51.5	3 40 9.1	16 10.1	59 14.57	1.667	14.9			.....	...
	31.0	53 55 28.8	3 12 24.2	16 4.4	58 53.44	1.847	15.4	31	L	0 47.7	2.41
Nov.	31.5	60 54 12.9	+2 42 5.6	15 58.1	58 30.42	-1.983	15.9	31	U	13 16.8	2.42
	1.0	67 46 41.8	2 9 48.6	15 51.5	58 6.05	2.072	16.4	Nov. 1	L	1 45.7	2.41
	1.5	74 32 43.5	1 36 8.0	15 44.6	57 40.89	2.116	16.9	1	U	14 14.5	2.38
	2.0	81 12 16.1	1 1 37.3	15 37.7	57 15.46	2.114	17.4	2	L	2 42.8	2.33
	2.5	87 45 26.4	+0 26 47.5	15 30.8	56 50.33	2.069	17.9	2	U	15 10.5	2.27
	3.0	94 12 29.4	-0 7 52.9	15 24.2	56 25.95	-1.988	18.4	3	L	3 37.4	2.21
	3.5	100 33 47.0	0 41 58.6	15 17.9	56 2.77	1.872	18.9	3	U	16 3.5	2.14
	4.0	106 49 46.5	1 15 6.9	15 12.0	55 41.14	1.728	19.4	4	L	4 28.7	2.06
	4.5	113 0 59.3	1 46 57.7	15 6.6	55 21.39	1.561	19.9	4	U	16 53.0	1.99
	5.0	119 8 0.5	2 17 13.6	15 1.8	55 3.75	1.376	20.4	5	L	5 16.4	1.92
	5.5	125 11 27.5	-2 45 39.1	14 57.6	54 48.44	-1.175	20.9	5	U	17 39.1	1.86
	6.0	131 11 58.7	3 12 0.8	14 54.1	54 35.60	0.963	21.4	6	L	6 1.1	1.81
	6.5	137 10 13.5	3 36 6.3	14 51.3	54 25.34	0.747	21.9	6	U	18 22.5	1.76
	7.0	143 6 50.9	3 57 44.5	14 49.2	54 17.67	0.530	22.4	7	L	6 43.4	1.73
	7.5	149 2 29.3	4 16 45.5	14 47.9	54 12.63	0.310	22.9	7	U	19 4.0	1.70
	8.0	154 57 46.2	-4 33 0.0	14 47.2	54 10.20	-0.007	23.4	8	L	7 24.3	1.69
	8.5	160 53 16.6	4 46 19.1	14 47.2	54 10.27	+0.107	23.9	8	U	19 44.5	1.68
	9.0	166 49 34.2	4 56 35.0	14 47.9	54 12.75	0.304	24.4	9	L	8 4.7	1.69
	9.5	172 47 9.7	5 3 40.3	14 49.2	54 17.52	0.488	24.9	9	U	20 25.1	1.71
	10.0	178 46 30.8	5 7 28.5	14 51.1	54 24.41	0.659	25.4	10	L	8 45.8	1.73
	10.5	184 48 2.1	-5 7 53.9	14 53.5	54 33.25	+0.813	25.9	10	U	21 6.7	1.77
	11.0	190 52 4.7	5 4 52.2	14 56.4	54 43.84	0.947	26.4	11	L	9 28.1	1.81
	11.5	196 58 56.4	4 58 20.4	14 59.6	54 55.91	1.062	26.9	11	U	21 50.2	1.87
	12.0	203 8 50.9	4 48 17.5	15 3.3	55 9.26	1.159	27.4	12	L	10 13.0	1.93
	12.5	209 21 58.4	4 34 44.7	15 7.2	55 23.64	1.233	27.9	12	U	22 36.6	2.00
	13.0	215 38 25.6	-4 17 45.6	15 11.3	55 38.78	+1.286	28.4	13	L	11 0.9	2.07
	13.5	221 58 15.8	3 57 26.6	15 15.6	55 54.44	1.321	28.9	13	U	23 26.1	2.14
	14.0	228 21 29.3	3 33 57.4	15 20.0	56 10.41	1.336	29.4			.....	...
	14.5	234 48 3.9	3 7 30.8	15 24.3	56 26.42	1.331	0.2	14	L	11 52.2	2.21
	15.0	241 17 55.4	2 38 22.8	15 28.6	56 42.29	1.311	0.7	15	U	0 19.0	2.27
	15.5	247 50 57.8	-2 6 53.1	15 32.9	56 57.84	+1.278	1.2	15	L	12 46.6	2.32
	16.0	254 27 4.4	-1 33 24.3	15 37.0	57 12.92	+1.233	1.7	16	U	1 14.6	2.35





GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit. Meridian of Green- wich.		
	Noon.				Noon.									Noon.	
	h	m	s	s	°	'	"	"			"	"	h	m	
Jan.	1	20	8	54.66	+11.874	21	30	48.2	+60.35	0.013 0168	-4399.8	3.24	8.54	1	26.7
	2	20	13	28.72	10.945	21	6	26.3	61.39	0.002 1984	4614.9	3.32	8.76	1	27.3
	3	20	17	39.05	9.895	20	41	46.3	61.84	9.990 8704	4823.6	3.42	8.99	1	27.5
	4	20	21	22.61	8.713	20	17	3.3	61.62	9.979 0547	5020.1	3.50	9.23	1	27.2
	5	20	24	36.17	7.394	19	52	34.5	60.64	9.966 7889	5197.6	3.60	9.50	1	26.5
	6	20	27	16.37	+ 5.933	19	28	38.9	+58.85	9.954 1282	-5347.5	3.71	9.78	1	25.2
	7	20	29	19.82	4.331	19	5	36.6	56.19	9.941 1515	5459.2	3.82	10.08	1	23.3
	8	20	30	43.18	2.595	18	43	48.9	52.63	9.927 9630	5522.0	3.95	10.39	1	20.7
	9	20	31	23.42	+ 0.741	18	23	37.3	48.19	9.914 6949	5523.4	4.07	10.71	1	17.4
	10	20	31	18.02	- 1.204	18	5	22.8	42.89	9.901 5099	5450.6	4.19	11.04	1	13.3
	11	20	30	25.18	- 3.204	17	49	24.8	+36.83	9.888 6007	-5291.9	4.32	11.37	1	8.5
	12	20	28	44.22	5.205	17	35	59.7	30.17	9.876 1852	5037.7	4.44	11.70	1	2.9
	13	20	26	15.80	7.147	17	25	20.1	23.07	9.864 5017	4681.2	4.56	12.02	0	56.4
	14	20	23	2.20	8.957	17	17	33.7	15.78	9.853 7984	4221.3	4.68	12.32	0	49.2
	15	20	19	7.50	10.560	17	12	42.3	8.53	9.844 3184	3663.0	4.78	12.59	0	41.4
	16	20	14	37.56	-11.882	17	10	41.6	+ 1.59	9.836 2854	-3018.2	4.87	12.83	0	33.0
	17	20	9	39.92	12.860	17	11	22.0	- 4.85	9.829 8848	2306.3	4.94	13.02	0	24.2
	18	20	4	23.41	13.449	17	14	28.8	10.59	9.825 2497	1551.6	4.99	13.16	0	15.0
	19	19	58	57.65	13.629	17	19	44.0	15.54	9.822 4495	781.6	5.03	13.24	0	5.7
	20	19	53	32.43	13.407	17	26	47.8	19.63	9.821 4873	- 24.8	5.04	13.27	23	56.4
	21	19	48	17.09	-12.813	17	35	19.7	-22.89	9.822 2990	+ 693.0	5.03	13.25	23	47.3
	22	19	43	19.99	11.896	17	45	0.4	25.37	9.824 7659	1351.3	5.00	13.17	23	38.4
	23	19	38	48.13	10.720	17	55	31.7	27.15	9.828 7258	1935.4	4.95	13.17	23	30.0
	24	19	34	46.90	9.355	18	6	37.7	28.27	9.833 9895	2436.8	4.90	13.05	23	22.1
	25	19	31	20.11	7.863	18	18	4.3	28.86	9.840 3545	2853.2	4.82	12.90	23	14.7
	26	19	28	30.01	- 6.305	18	18	4.3	28.86	9.840 3545	2853.2	4.82	12.71	23	7.9
	27	19	28	30.01	- 6.305	18	29	39.5	-29.00	9.847 6194	+3187.5	4.74	12.50	23	1.8
	28	19	26	17.62	4.729	18	41	13.0	28.73	9.855 5930	3444.9	4.66	12.27	22	56.2
	29	19	24	42.83	3.176	18	52	35.6	28.10	9.864 0995	3633.2	4.56	12.03	22	56.2
	30	19	23	44.76	1.674	19	3	39.5	27.17	9.872 9844	3761.7	4.48	11.79	22	51.3
	31	19	23	21.92	- 0.242	19	14	17.8	25.98	9.882 1147	3839.0	4.38	11.54	22	47.0
Feb.	1	19	23	32.45	+ 1.105	19	24	24.4	-24.53	9.891 3776	+3873.9	4.29	11.54	22	43.2
	2	19	24	14.25	2.363	19	33	53.7	22.88	9.900 6817	3874.3	4.29	11.30	22	39.9
	3	19	24	14.25	2.363	19	33	53.7	22.88	9.900 6817	3874.3	4.19	11.06	22	37.2
	4	19	25	25.14	3.529	19	42	40.9	21.02	9.909 9518	3846.7	4.11	10.83	22	34.8
	5	19	27	2.92	4.604	19	50	41.4	19.00	9.919 1287	3797.5	4.02	10.60	22	32.9
	6	19	29	5.44	5.592	19	57	51.5	16.82	9.928 1665	3751.5	3.94	10.38	22	31.3
	7	19	31	30.64	+ 6.495	20	4	7.7	-14.50	9.937 0296	+3652.7	3.86	10.17	22	30.1
	8	19	34	16.58	7.321	20	9	26.7	12.06	9.945 6924	3565.0	3.79	9.97	22	29.3
	9	19	37	21.46	8.074	20	13	45.8	9.51	9.954 1365	3470.7	3.71	9.78	22	28.7
	10	19	40	43.60	8.761	20	17	2.4	6.86	9.962 3487	3372.3	3.64	9.60	22	28.4
	11	19	44	21.48	9.386	20	19	14.4	4.13	9.970 3216	3271.4	3.58	9.42	22	28.3
	12	19	48	13.70	+ 9.956	20	20	20.0	- 1.32	9.978 0505	+3169.4	3.51	9.26	22	28.4
	13	19	52	18.98	10.475	20	20	17.2	+ 1.56	9.985 5349	3067.5	3.46	9.10	22	28.7
	14	19	56	36.14	10.948	20	19	4.6	4.49	9.992 7753	2966.3	3.40	8.95	22	29.2
	15	20	1	4.16	11.380	20	16	41.1	7.48	9.999 7745	2866.7	3.34	8.80	22	29.9
	16	20	5	42.05	11.772	20	13	5.3	10.51	0.006 5370	2768.9	3.29	8.67	22	30.7
17	20	10	28.96	+12.131	20	8	16.5	+13.57	0.013 0671	+2673.2	3.24	8.54	22	31.7	
18	20	15	24.11	+12.459	20	2	13.6	+16.67	0.019 3706	+2580.1	3.20	8.42	22	32.8	

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"			"	"	h	m	
Feb.	16	20	15	24.11	+12.459	20	2	13.6	+ 16.67	0.019 3706	+2580.1	3.20	8.42	22	32.8
	17	20	20	26.77	12.758	19	54	56.1	19.79	0.025 4536	2489.5	3.15	8.30	22	34.0
	18	20	25	36.31	13.033	19	46	23.3	22.94	0.031 3224	2401.6	3.11	8.19	22	35.3
	19	20	30	52.15	13.283	19	36	34.7	26.11	0.036 9832	2316.2	3.06	8.08	22	36.8
	20	20	36	13.74	13.513	19	25	30.0	29.29	0.042 4425	2233.6	3.03	7.98	22	38.3
	21	20	41	40.62	+13.724	19	13	8.8	+ 32.48	0.047 7065	+2153.6	2.99	7.88	22	39.8
	22	20	47	12.35	13.918	18	59	30.9	35.69	0.052 7817	2076.1	2.96	7.79	22	41.5
	23	20	52	48.57	14.097	18	44	35.9	38.90	0.057 6736	2001.0	2.92	7.71	22	43.2
	24	20	58	28.90	14.262	18	28	23.9	42.11	0.062 3883	1928.2	2.89	7.62	22	45.0
	25	21	4	13.06	14.415	18	10	54.7	45.32	0.066 9309	1857.7	2.86	7.54	22	46.9
Mar.	26	21	10	0.75	+14.557	17	52	8.3	+ 48.55	0.071 3068	+1789.2	2.84	7.47	22	48.8
	27	21	15	51.74	14.690	17	32	4.4	51.77	0.075 5206	1722.5	2.81	7.39	22	50.7
	28	21	21	45.81	14.815	17	10	43.3	54.99	0.079 5762	1657.5	2.78	7.33	22	52.7
	1	21	27	42.78	14.932	16	48	4.9	58.21	0.083 4781	1594.2	2.76	7.26	22	54.8
	2	21	33	42.49	15.043	16	24	9.3	61.43	0.087 2294	1532.1	2.74	7.20	22	56.9
	3	21	39	44.80	+15.149	15	58	56.4	+ 64.64	0.090 8333	+1471.2	2.72	7.14	22	59.0
	4	21	45	49.59	15.250	15	32	26.5	67.85	0.094 2922	1411.4	2.69	7.08	23	1.2
	5	21	51	56.77	15.348	15	4	39.6	71.05	0.097 6085	1352.2	2.67	7.03	23	3.4
	6	21	58	6.26	15.443	14	35	36.0	74.25	0.100 7831	1293.4	2.65	6.98	23	5.7
	7	22	4	18.01	15.536	14	5	15.7	77.44	0.103 8174	1235.2	2.63	6.93	23	8.0
	8	22	10	31.98	+15.628	13	33	38.9	+ 80.62	0.106 7123	+1177.1	2.61	6.88	23	10.3
	9	22	16	48.16	15.720	13	0	46.0	83.79	0.109 4673	1118.7	2.60	6.84	23	12.7
	10	22	23	6.52	15.811	12	26	37.1	86.95	0.112 0817	1059.9	2.58	6.80	23	15.1
	11	22	29	27.11	15.904	11	51	12.5	90.10	0.114 5543	1000.5	2.56	6.76	23	17.5
	12	22	35	49.94	15.998	11	14	32.5	93.23	0.116 8833	940.1	2.55	6.72	23	20.0
	13	22	42	15.04	+16.094	10	36	37.7	+ 96.34	0.119 0658	+ 878.4	2.54	6.69	23	22.5
	14	22	48	42.48	16.193	9	57	28.3	99.44	0.121 0981	815.0	2.52	6.66	23	25.1
	15	22	55	12.33	16.295	9	17	5.0	102.50	0.122 9763	749.7	2.51	6.63	23	27.7
	16	23	1	44.65	16.400	8	35	28.4	105.55	0.124 6949	682.0	2.50	6.60	23	30.3
	17	23	8	19.54	16.509	7	52	39.0	108.56	0.126 2479	611.6	2.49	6.58	23	33.0
	18	23	14	57.09	+16.621	7	8	38.0	+111.52	0.127 6280	+ 537.9	2.49	6.56	23	35.7
	19	23	21	37.41	16.739	6	23	26.2	114.45	0.128 8270	460.6	2.49	6.55	23	38.5
	20	23	28	20.60	16.861	5	37	4.8	117.32	0.129 8357	379.0	2.48	6.53	23	41.3
	21	23	35	6.76	16.986	4	49	35.3	120.15	0.130 6432	293.0	2.47	6.51	23	44.2
	22	23	41	55.99	17.117	4	0	59.3	122.86	0.131 2380	201.7	2.47	6.50	23	47.2
	23	23	48	48.41	+17.252	3	11	18.9	+125.50	0.131 6067	+ 104.5	2.47	6.50	23	50.2
	24	23	55	44.10	17.389	2	20	36.3	128.03	0.131 7347	+ 1.0	2.47	6.50	23	53.2
	25	0	2	43.12	17.530	1	28	54.3	130.44	0.131 6060	- 109.5	2.47	6.50	23	56.3
	26	0	9	45.54	17.672	0	36	16.2	132.71	0.131 2031	227.6	2.47	6.50	23	59.5
	27	0	16	51.37	17.814	+ 0	17	14.2	134.80	0.130 5072	353.7	2.47	6.51	...	...
	28	0	24	0.61	+17.955	+ 1	11	32.6	+136.69	0.129 4981	- 488.7	2.48	6.53	0	2.7
	29	0	31	13.19	18.092	2	6	33.6	138.35	0.128 1539	632.9	2.49	6.55	0	6.0
	30	0	38	28.99	18.223	3	2	11.4	139.75	0.126 4526	786.6	2.49	6.58	0	9.3
	31	0	45	47.83	18.345	3	58	19.2	140.84	0.124 3705	950.1	2.50	6.61	0	12.7
Apr.	1	0	53	9.44	18.454	4	54	49.1	141.59	0.121 8842	1123.5	2.52	6.65	0	16.1
	2	1	0	33.46	+18.545	+ 5	51	32.5	+141.96	0.118 9700	-1306.6	2.54	6.69	0	19.6
	3	1	7	59.43	+18.615	+ 6	48	19.6	+141.90	0.115 6050	-1499.0	2.56	6.74	0	23

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"	Noon.	Noon.	"	"	h	m
Apr.	1	0	53	9.44	+18.454	+	4 54	49.1	+141.59	0.121 8842	-1123.5	2.52	6.65	0 16.1
	2	1	0	33.46	18.545		5 51	32.5	141.96	0.118 9700	1306.6	2.54	6.69	0 19.6
	3	1	7	59.43	18.615		6 48	19.6	141.90	0.115 6050	1499.0	2.56	6.74	0 23.1
	4	1	15	26.78	18.659		7 44	59.8	141.37	0.111 7679	1700.0	2.58	6.80	0 26.6
	5	1	22	54.82	18.672		8 41	21.5	140.35	0.107 4392	1908.4	2.61	6.87	0 30.1
	6	1	30	22.76	+18.650	+	9 37	12.4	+138.80	0.102 6027	-2122.9	2.64	6.95	0 33.7
	7	1	37	49.68	18.586		10 32	19.7	136.71	0.097 2457	2341.9	2.67	7.03	0 37.2
	8	1	45	14.55	18.479		11 26	30.2	134.07	0.091 3598	2563.3	2.71	7.13	0 40.7
	9	1	52	36.28	18.324		12 19	30.5	130.87	0.084 9417	2785.0	2.75	7.24	0 44.1
	10	1	59	53.67	18.117		13 11	7.6	127.14	0.077 9935	3004.6	2.79	7.35	0 47.4
	11	2	7	5.48	+17.858	+	14 1	8.9	+122.89	0.070 5228	-3220.1	2.84	7.48	0 50.7
	12	2	14	10.45	17.547		14 49	22.7	118.18	0.062 5424	3429.0	2.89	7.62	0 53.8
	13	2	21	7.30	17.182		15 35	38.2	113.05	0.054 0706	3629.3	2.95	7.77	0 56.8
	14	2	27	54.78	16.766		16 19	46.0	107.54	0.045 1301	3819.1	3.01	7.93	0 59.7
	15	2	34	31.66	16.299		17 1	37.7	101.72	0.035 7480	3997.2	3.07	8.10	1 2.4
	16	2	40	56.76	+15.785	+	17 41	6.6	+ 95.65	0.025 9540	-4162.1	3.15	8.29	1 4.8
	17	2	47	8.97	15.225		18 18	7.3	89.38	0.015 7815	4312.7	3.23	8.49	1 7.1
	18	2	53	7.24	14.624		18 52	35.5	82.95	0.005 2649	4448.6	3.30	8.69	1 9.1
	19	2	58	50.60	13.983		19 24	28.3	76.43	9.994 4403	4569.3	3.38	8.91	1 10.9
	20	3	4	18.11	13.304		19 53	43.8	69.85	9.983 3448	4674.3	3.47	9.14	1 12.4
	21	3	9	28.92	+12.592	+	20 20	21.0	+ 63.24	9.972 0163	-4763.5	3.57	9.39	1 13.6
	22	3	14	22.26	11.848		20 44	19.5	56.63	9.960 4928	4836.8	3.66	9.64	1 14.5
	23	3	18	57.38	11.074		21 5	39.5	50.04	9.948 8128	4893.8	3.76	9.90	1 15.1
	24	3	23	13.60	10.274		21 24	21.7	43.48	9.937 0159	4934.3	3.86	10.17	1 15.5
	25	3	27	10.31	9.448		21 40	27.0	36.97	9.925 1414	4958.2	3.97	10.46	1 15.4
	26	3	30	46.94	+ 8.601	+	21 53	56.6	+ 30.51	9.913 2301	-4965.0	4.08	10.75	1 15.1
	27	3	34	2.98	7.733		22 4	51.9	24.11	9.901 3236	4954.1	4.19	11.04	1 14.4
	28	3	36	57.99	6.849		22 13	14.3	17.76	9.889 4651	4925.0	4.31	11.35	1 13.4
	29	3	39	31.61	5.951		22 19	5.1	11.49	9.877 6990	4876.8	4.42	11.66	1 12.0
	30	3	41	43.55	5.043		22 22	26.1	+ 5.27	9.866 0723	4808.8	4.54	11.98	1 10.2
May	1	3	43	33.64	+ 4.131	+	22 23	18.7	- 0.89	9.854 6334	-4720.0	4.67	12.30	1 8.1
	2	3	45	1.82	3.218		22 21	44.8	6.93	9.843 4337	4609.5	4.79	12.62	1 5.6
	3	3	46	8.14	2.311		22 17	46.7	12.90	9.832 5260	4476.4	4.91	12.94	1 2.7
	4	3	46	52.83	1.416		22 11	26.7	18.75	9.821 9659	4319.7	5.03	13.26	0 59.5
	5	3	47	16.28	+ 0.542		22 2	48.1	24.45	9.811 8108	4136.9	5.15	13.57	0 56.0
	6	3	47	19.10	- 0.302	+	21 51	54.5	- 29.98	9.802 1191	-3933.3	5.27	13.88	0 52.1
	7	3	47	2.08	1.110		21 38	50.8	35.29	9.792 9509	3702.8	5.38	14.17	0 47.9
	8	3	46	26.22	1.870		21 23	42.9	40.32	9.784 3653	3447.6	5.49	14.46	0 43.3
	9	3	45	32.77	2.574		21 6	37.9	45.03	9.776 4216	3168.2	5.59	14.72	0 38.5
	10	3	44	23.19	3.212		20 47	44.6	49.35	9.769 1760	2866.1	5.68	14.97	0 33.4
	11	3	42	59.19	- 3.775	+	20 27	12.9	- 53.20	9.762 6814	-2542.7	5.77	15.20	0 28.1
	12	3	41	22.64	4.256		20 5	15.0	56.53	9.756 9863	2200.2	5.84	15.40	0 22.5
	13	3	39	35.62	4.647		19 42	4.0	59.27	9.752 1333	1841.7	5.90	15.57	0 16.8
	14	3	37	40.33	4.944		19 17	55.1	61.36	9.748 1561	1470.6	5.96	15.72	0 11.0
	15	3	35	39.08	5.143		18 53	4.5	62.74	9.745 0818	1090.3	6.00	15.83	0 5.1
	16	3	33	34.26	- 5.242	+	18 27	49.3	- 63.39	9.742 9268	- 705.0	6.03	15.91	23 53.0
	17	3	31	28.25	- 5.242	+	18 2	27.7	- 63.28	9.741 6986	- 318.8	6.05	15.95	23 47.0

## GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h m
May	17	3 31 28.25	- 5.242	+18 2 27.7	-63.28	9.741 6986	- 318.8	6.05	15.95	23 47.0
	18	3 29 23.38	5.148	17 37 17.8	62.41	9.741 3937	+ 63.9	6.05	15.96	23 41.1
	19	3 27 21.90	4.900	17 12 37.9	60.80	9.741 9996	439.4	6.04	15.94	23 35.3
	20	3 25 25.98	4.687	16 48 45.3	58.46	9.743 4938	803.8	6.02	15.88	23 29.5
	21	3 23 37.56	4.355	16 25 56.9	55.47	9.745 8462	1153.8	5.99	15.80	23 23.9
	22	3 21 58.45	- 3.913	+16 4 27.7	-51.87	9.749 0184	+1486.7	5.95	15.68	23 18.5
	23	3 20 30.23	3.429	15 44 31.5	47.73	9.752 9668	1800.2	5.90	15.54	23 13.4
	24	3 19 14.28	2.892	15 26 20.1	43.15	9.757 6426	2092.7	5.83	15.38	23 8.4
	25	3 18 11.76	2.311	15 10 3.4	38.19	9.762 9943	2363.2	5.76	15.19	23 3.6
	26	3 17 23.64	1.694	14 55 49.5	32.93	9.768 9679	2611.0	5.68	14.98	22 59.1
	27	3 16 50.67	- 1.049	+14 43 44.3	-27.47	9.775 5087	+2836.0	5.60	14.76	22 54.9
	28	3 16 33.44	- 0.384	14 33 52.0	21.87	9.782 5625	3038.3	5.50	14.52	22 51.0
	29	3 16 32.35	+ 0.296	14 26 15.0	16.21	9.790 0763	3219.4	5.41	14.27	22 47.3
	30	3 16 47.70	0.984	14 20 54.2	10.53	9.797 9992	3379.6	5.31	14.01	22 43.9
	31	3 17 19.63	1.677	14 17 49.1	- 4.91	9.806 2825	3519.9	5.22	13.75	22 40.7
June	1	3 18 8.21	+ 2.371	+14 16 57.9	+ 0.62	9.814 8801	+5641.9	5.11	13.48	22 37.8
	2	3 19 13.40	3.062	14 18 17.9	6.02	9.823 7498	3746.7	5.01	13.20	22 35.3
	3	3 20 35.14	3.749	14 21 45.4	11.24	9.832 8515	3835.5	4.90	12.93	22 32.9
	4	3 22 13.28	4.429	14 27 16.1	16.28	9.842 1487	3909.9	4.80	12.66	22 30.9
	5	3 24 7.65	5.101	14 34 45.1	21.10	9.851 6080	3970.7	4.70	12.38	22 29.1
	6	3 26 18.09	+ 5.767	+14 44 6.9	+25.68	9.861 1983	+4019.4	4.59	12.11	22 27.6
	7	3 28 44.42	6.425	14 55 15.9	30.02	9.870 8920	4056.9	4.50	11.85	22 26.3
	8	3 31 26.44	7.075	15 8 6.0	34.11	9.880 6629	4084.0	4.39	11.58	22 25.3
	9	3 34 23.97	7.718	15 22 30.9	37.93	9.890 4875	4101.7	4.30	11.32	22 24.6
	10	3 37 36.86	8.356	15 38 24.2	41.47	9.900 3444	4111.0	4.20	11.07	22 24.1
	11	3 41 4.98	+ 8.987	+15 55 39.3	+44.74	9.910 2139	+4112.1	4.10	10.82	22 23.9
	12	3 44 48.18	9.613	16 14 9.5	47.73	9.920 0765	4105.7	4.01	10.58	22 23.9
	13	3 48 46.40	10.238	16 33 47.9	50.42	9.929 9156	4092.3	3.93	10.34	22 24.1
	14	3 52 59.57	10.859	16 54 27.5	52.83	9.939 7143	4072.2	3.85	10.11	22 24.6
	15	3 57 27.64	11.481	17 16 1.4	54.94	9.949 4571	4045.6	3.76	9.89	22 25.4
	16	4 2 10.64	+12.102	+17 38 22.2	+56.74	9.959 1281	+4012.5	3.67	9.67	22 26.4
	17	4 7 8.56	12.725	18 1 22.4	58.22	9.968 7121	3973.1	3.59	9.46	22 27.7
	18	4 12 21.46	13.350	18 24 54.4	59.39	9.978 1936	3927.1	3.51	9.25	22 29.2
	19	4 17 49.40	13.979	18 48 50.2	60.21	9.987 5568	3874.4	3.44	9.06	22 30.9
	20	4 23 32.46	14.611	19 13 1.7	60.69	9.996 7852	3814.7	3.37	8.87	22 32.9
	21	4 29 30.73	+15.245	+19 37 20.1	+60.79	0.005 8618	+3747.9	3.29	8.68	22 35.2
	22	4 35 44.26	15.883	20 1 36.5	60.51	0.014 7688	3673.3	3.23	8.51	22 37.7
	23	4 42 13.14	16.524	20 25 41.5	59.83	0.023 4870	3590.5	3.17	8.34	22 40.5
	24	4 48 57.39	17.164	20 49 25.1	58.73	0.031 9963	3499.1	3.10	8.17	22 43.6
	25	4 55 57.00	17.803	21 12 37.0	57.19	0.040 2752	3398.4	3.04	8.02	22 46.9
	26	5 3 11.88	+18.436	+21 35 6.4	+55.18	0.048 3009	+3288.1	2.98	7.87	22 50.4
	27	5 10 41.87	19.061	21 56 41.8	52.69	0.056 0501	3167.8	2.93	7.73	22 54.2
	28	5 18 26.71	19.672	22 17 11.8	49.72	0.063 4981	3037.1	2.88	7.60	22 58.3
	29	5 26 25.99	20.264	22 36 24.3	46.24	0.070 6195	2895.7	2.84	7.48	23 2.5
	30	5 34 39.19	20.831	22 54 7.1	42.25	0.077 3889	2743.7	2.79	7.36	23 7.1
July	1	5 43 5.60	+21.364	+23 10 8.2	+37.76	0.083 7811	+2581.4	2.76	7.26	23 11.8
	2	5 51 44.35	+21.857	+23 24 15.9	+32.80	0.089 7719	+2409.3	2.72	7.16	23 16.7



MERCURY, 1917.  
GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit. Meridian of Green- wich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h m
July	1	5 43 5.60	+21.364	+23 10 8.2	+ 37.76	0.083 7811	+2581.4	2.76	7.26	23 11.8
	2	5 51 44.35	21.857	23 24 15.9	32.80	0.089 7719	2409.3	2.72	7.16	23 16.7
	3	6 0 34.37	22.303	23 36 18.8	27.37	0.095 3386	2228.1	2.68	7.07	23 21.7
	4	6 9 34.45	22.694	23 46 6.4	21.53	0.100 4606	2039.0	2.65	6.99	23 27.0
	5	6 18 43.18	23.023	23 53 29.3	15.32	0.105 1207	1843.4	2.62	6.91	23 32.3
	6	6 27 59.02	+23.285	+23 58 19.6	+ 8.82	0.109 3053	+1643.1	2.60	6.84	23 37.7
	7	6 37 20.31	23.477	24 0 30.7	+ 2.07	0.113 0050	1439.6	2.57	6.78	23 43.2
	8	6 46 45.33	23.596	23 59 58.0	- 4.81	0.116 2146	1235.2	2.55	6.73	23 48.8
	9	6 56 12.31	23.641	23 56 39.1	11.77	0.118 9349	1032.0	2.53	6.69	23 54.3
	10	7 5 39.51	23.614	23 50 33.0	18.72	0.121 1702	831.4	2.52	6.66	23 59.8
	11	7 15 5.24	+23.519	+23 41 41.1	- 25.58	0.122 9292	+ 635.6	2.51	6.63	. . . . .
	12	7 24 27.89	23.359	23 30 6.3	32.29	0.124 2259	446.1	2.50	6.61	0 5.2
	13	7 33 46.03	23.143	23 15 53.1	38.77	0.125 0761	263.8	2.50	6.60	0 10.6
	14	7 42 58.33	22.875	22 59 7.4	44.99	0.125 4989	+ 90.1	2.49	6.59	0 15.9
	15	7 52 3.66	22.563	22 39 56.2	50.89	0.125 5156	- 74.7	2.50	6.60	0 21.1
	16	8 1 1.04	+22.213	+22 18 27.2	- 56.46	0.125 1479	- 230.0	2.50	6.60	0 26.1
	17	8 9 49.68	21.835	21 54 48.9	61.67	0.124 4192	375.7	2.50	6.61	0 31.0
	18	8 18 28.93	21.433	21 29 9.8	66.52	0.123 3518	512.1	2.51	6.62	0 35.7
	19	8 26 58.32	21.014	21 1 38.8	71.00	0.121 9682	639.4	2.52	6.64	0 40.3
	20	8 35 17.49	20.582	20 32 24.9	75.11	0.120 2897	757.9	2.53	6.67	0 44.6
	21	8 43 26.22	+20.144	+20 1 36.5	- 78.86	0.118 3368	- 868.2	2.54	6.70	0 48.9
	22	8 51 24.37	19.702	19 29 22.2	82.27	0.116 1286	970.8	2.55	6.73	0 52.9
	23	8 59 11.91	19.260	18 55 50.1	85.35	0.113 6826	1066.4	2.56	6.77	0 56.7
	24	9 6 48.87	18.821	18 21 8.0	88.11	0.111 0152	1155.6	2.58	6.81	1 0.4
	25	9 14 15.33	18.385	17 45 23.2	90.57	0.108 1406	1238.8	2.60	6.86	1 3.9
	26	9 21 31.41	+17.957	+17 8 42.8	- 92.75	0.105 0730	-1316.8	2.62	6.91	1 7.2
	27	9 28 37.31	17.536	16 31 13.3	94.67	0.101 8235	1390.3	2.64	6.97	1 10.4
	28	9 35 33.20	17.123	15 53 0.8	96.33	0.098 4028	1459.6	2.66	7.02	1 13.4
	29	9 42 19.28	16.719	15 14 11.4	97.75	0.094 8201	1525.4	2.68	7.07	1 16.2
	30	9 48 55.78	16.324	14 34 50.4	98.96	0.091 0836	1588.0	2.71	7.13	1 18.9
	31	9 55 22.91	+15.939	+13 55 3.1	- 99.95	0.087 2001	-1647.9	2.74	7.20	1 21.4
Aug.	1	10 1 40.90	15.562	13 14 54.2	100.75	0.083 1757	1705.5	2.76	7.27	1 23.7
	2	10 7 49.94	15.194	12 34 28.4	101.37	0.079 0151	1761.4	2.78	7.33	1 25.9
	3	10 13 50.27	14.835	11 53 50.0	101.81	0.074 7223	1815.7	2.81	7.41	1 28.0
	4	10 19 42.06	14.482	11 13 3.0	102.08	0.070 3009	1868.7	2.84	7.48	1 29.9
	5	10 25 25.49	+14.138	+10 32 11.5	-102.19	0.065 7530	-1920.9	2.87	7.56	1 31.7
	6	10 31 0.73	13.800	9 51 19.2	102.15	0.061 0806	1972.6	2.90	7.65	1 33.3
	7	10 36 27.92	13.467	9 10 29.7	101.96	0.056 2845	2024.0	2.93	7.73	1 34.8
	8	10 41 47.18	13.139	8 29 46.4	101.62	0.051 3654	2075.2	2.96	7.82	1 36.2
	9	10 46 58.62	12.815	7 49 12.9	101.15	0.046 3232	2126.6	3.00	7.91	1 37.4
	10	10 52 2.31	+12.493	+ 7 8 52.5	-100.53	0.041 1574	-2178.3	3.04	8.00	1 38.5
	11	10 56 58.30	12.173	6 28 48.6	99.77	0.035 8670	2230.4	3.07	8.10	1 39.5
	12	11 1 46.60	11.853	5 49 4.4	98.88	0.030 4508	2283.1	3.11	8.20	1 40.4
	13	11 6 27.23	11.532	5 9 43.3	97.85	0.024 9073	2336.6	3.15	8.31	1 41.1
	14	11 11 0.12	11.209	4 30 48.6	96.68	0.019 2346	2390.7	3.19	8.42	1 41.7
	15	11 15 25.23	+10.882	+ 3 52 23.9	- 95.36	0.013 4312	-2445.7	3.24	8.53	1 42.2
	16	11 19 42.44	+10.551	+ 3 14 32.6	- 93.89	0.007 4945	-2501.6	3.28	8.65	1 42.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit. Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Aug. 16	11	19	42.44	+10.551	+3	14	32.6	- 93.89	0.007 4945	-2501.6	3.28	8.65	1 42.5
17	11	23	51.61	10.212	2	37	18.2	92.27	0.001 4228	2558.2	3.32	8.77	1 42.7
18	11	27	52.56	9.866	2	0	44.7	90.49	9.995 2141	2615.8	3.38	8.90	1 42.8
19	11	31	45.08	9.509	1	24	56.0	88.54	9.988 8665	2674.0	3.43	9.03	1 42.7
20	11	35	28.90	9.140	0	49	56.3	86.41	9.982 3785	2732.7	3.47	9.16	1 42.5
21	11	39	3.72	+ 8.758	+0	15	50.0	- 84.09	9.975 7491	-2791.8	3.53	9.31	1 42.1
22	11	42	29.17	8.380	-0	17	18.2	81.57	9.968 9778	2850.9	3.59	9.45	1 41.6
23	11	45	44.85	7.946	0	49	23.4	78.82	9.962 0648	2909.9	3.64	9.60	1 40.9
24	11	48	50.30	7.507	1	20	19.9	75.85	9.955 0110	2968.1	3.70	9.76	1 40.0
25	11	51	45.00	7.047	1	50	2.0	72.62	9.947 8192	3024.9	3.76	9.92	1 39.0
26	11	54	28.38	+ 6.563	-2	18	23.6	- 69.12	9.940 4931	-3079.9	3.83	10.09	1 37.7
27	11	56	59.80	6.050	2	45	17.6	65.33	9.933 0383	3131.8	3.89	10.27	1 36.3
28	11	59	18.56	5.508	3	10	36.8	61.21	9.925 4635	3179.8	3.96	10.45	1 34.7
29	12	1	23.92	4.933	3	34	13.1	56.75	9.917 7793	3222.8	4.03	10.63	1 32.8
30	12	3	15.06	4.323	3	55	57.9	51.92	9.909 9995	3259.1	4.11	10.83	1 30.7
31	12	4	51.13	+ 3.677	-4	15	41.9	- 46.68	9.902 1424	-3287.0	4.18	11.02	1 28.3
Sept. 1	12	6	11.24	2.992	4	33	15.2	41.01	9.894 2304	3304.3	4.26	11.23	1 25.7
2	12	7	14.44	2.268	4	48	26.9	34.88	9.886 2921	3308.7	4.34	11.43	1 22.8
3	12	7	59.78	1.504	5	1	5.7	28.26	9.878 3611	3297.6	4.42	11.64	1 19.6
4	12	8	26.33	+ 0.702	5	10	59.6	21.14	9.870 4789	3267.6	4.50	11.86	1 16.1
5	12	8	33.18	- 0.137	-5	17	56.3	- 13.49	9.862 6949	-3215.0	4.58	12.07	1 12.3
6	12	8	19.51	1.007	5	21	42.9	- 5.31	9.855 0681	3136.1	4.67	12.29	1 8.1
7	12	7	44.61	1.905	5	22	7.2	+ 3.38	9.847 6663	3026.5	4.74	12.50	1 3.6
8	12	6	47.95	2.819	5	18	56.8	12.56	9.840 5690	2881.7	4.82	12.70	0 58.7
9	12	5	29.28	3.737	5	12	1.2	22.14	9.833 8662	2696.9	4.90	12.90	0 53.4
10	12	3	48.64	- 4.646	-5	1	11.3	+ 32.06	9.827 6596	-2467.7	4.97	13.09	0 47.8
11	12	1	46.49	5.526	4	46	20.9	42.16	9.822 0598	2190.4	5.03	13.26	0 41.9
12	11	59	23.80	6.354	4	27	27.4	52.28	9.817 1868	1861.7	5.09	13.41	0 35.6
13	11	56	42.11	7.105	4	4	33.3	62.17	9.813 1660	1480.1	5.13	13.53	0 28.9
14	11	53	43.60	7.751	3	37	47.1	71.58	9.810 1247	1045.7	5.17	13.63	0 22.1
15	11	50	31.12	- 8.264	-3	7	23.9	+ 80.20	9.808 1868	- 561.1	5.20	13.69	0 14.9
16	11	47	8.20	8.617	2	33	46.4	87.71	9.807 4673	- 31.6	5.20	13.71	0 7.7
17	11	43	39.01	8.783	1	57	25.3	93.79	9.808 0648	+ 534.9	5.20	13.69	{ 0 0.3 23 52.8
18	11	40	8.25	8.745	1	18	58.1	98.16	9.810 0558	1127.5	5.17	13.63	23 45.5
19	11	36	41.03	8.488	-0	39	9.2	100.56	9.813 4872	1733.0	5.13	13.52	23 38.3
20	11	33	22.69	- 8.005	+0	1	12.2	+100.86	9.818 3729	+2337.0	5.08	13.37	23 31.3
21	11	30	18.52	7.306	0	41	14.6	98.97	9.824 6911	2924.0	5.00	13.18	23 24.6
22	11	27	33.64	6.401	1	20	5.4	94.92	9.832 3827	3479.2	4.92	12.95	23 18.3
23	11	25	12.72	5.314	1	56	54.5	88.85	9.841 3553	3989.5	4.82	12.68	23 12.5
24	11	23	19.82	4.071	2	30	55.3	80.94	9.851 4868	4443.3	4.71	12.39	23 7.2
25	11	21	58.26	- 2.708	+3	1	27.1	+ 71.47	9.862 6313	+4832.5	4.58	12.07	23 2.5
26	11	21	10.53	- 1.259	3	27	56.0	60.75	9.874 6266	5151.7	4.46	11.74	22 58.3
27	11	20	58.24	+ 0.240	3	49	55.6	49.08	9.887 3014	5398.4	4.33	11.41	22 54.8
28	11	21	22.16	1.753	4	7	6.8	36.78	9.900 4812	5573.0	4.20	11.07	22 51.8
29	11	22	22.26	3.250	4	19	18.3	24.14	9.913 9963	5678.2	4.07	10.73	22 49.4
30	11	23	57.80	+ 4.702	+4	26	25.1	+ 11.44	9.927 6845	+5718.2	3.95	10.39	22 47.6
Oct. 1	11	26	7.39	+ 6.085	+4	28	28.6	- 1.10	9.941 3965	+5699.2	3.82	10.07	22 46.3

140

MERCURY, 1917.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.		
	h	m	s	s	°	'	"	"			"	"	h m	
Oct.	1	11	26	7.39	+ 6.085	+ 4	28	28.6	- 1.10	9.941 3965	+5699.2	3.82	10.07	22 46.3
	2	11	28	49.18	7.382	4	25	35.4	13.26	9.954 9986	5627.8	3.70	9.76	22 45.6
	3	11	32	0.93	8.579	4	17	56.6	24.88	9.968 3740	5511.4	3.59	9.46	22 45.3
	4	11	35	40.12	9.668	4	5	46.5	35.84	9.981 4232	5357.4	3.48	9.18	22 45.4
	5	11	39	44.09	10.644	3	49	22.5	46.02	9.994 0658	5173.6	3.39	8.92	22 45.8
	6	11	44	10.12	+11.507	+ 3	29	3.9	- 55.39	0.006 2379	+4966.5	3.29	8.67	22 46.6
	7	11	48	55.53	12.259	3	5	10.9	63.88	0.017 8917	4742.9	3.21	8.44	22 47.7
	8	11	53	57.72	12.907	2	38	4.8	71.49	0.028 9951	4508.6	3.12	8.23	22 49.0
	9	11	59	14.28	13.457	2	8	6.3	78.24	0.039 5283	4268.5	3.05	8.03	22 50.6
	10	12	4	42.96	13.919	1	35	36.2	84.14	0.049 4825	4026.7	2.98	7.85	22 52.3
	11	12	10	21.75	+14.301	+ 1	0	54.1	- 89.24	0.058 8582	+3787.1	2.91	7.68	22 54.1
	12	12	16	8.83	14.610	+ 0	24	18.8	93.58	0.067 6638	3552.0	2.86	7.53	22 56.1
	13	12	22	2.63	14.862	- 0	13	52.3	97.23	0.075 9128	3323.4	2.81	7.39	22 58.1
	14	12	28	1.81	15.061	0	53	23.2	100.24	0.083 6227	3103.1	2.76	7.26	23 0.2
	15	12	34	5.18	15.214	1	33	59.2	102.66	0.090 8150	2892.0	2.72	7.14	23 2.4
	16	12	40	11.79	+15.331	- 2	15	26.9	-104.56	0.097 5119	+2690.3	2.67	7.03	23 4.6
	17	12	46	20.83	15.417	2	57	34.5	105.99	0.103 7366	2498.8	2.63	6.93	23 6.8
	18	12	52	31.63	15.479	3	40	11.2	107.00	0.109 5141	2317.2	2.60	6.84	23 9.1
	19	12	58	43.66	15.521	4	23	7.5	107.64	0.114 8671	2145.2	2.56	6.75	23 11.4
	20	13	4	56.51	15.547	5	6	15.0	107.94	0.119 8189	1982.8	2.53	6.68	23 13.6
	21	13	11	9.84	+15.562	- 5	49	26.1	-107.94	0.124 3916	+1829.3	2.50	6.61	23 15.9
	22	13	17	23.42	15.568	6	32	34.3	107.69	0.128 6062	1684.2	2.48	6.54	23 18.2
	23	13	23	37.07	15.568	7	15	33.6	107.21	0.132 4820	1547.1	2.46	6.49	23 20.5
	24	13	29	50.67	15.565	7	58	18.9	106.53	0.136 0384	1417.6	2.44	6.43	23 22.8
	25	13	36	4.15	15.559	8	40	45.7	105.67	0.139 2919	1294.8	2.43	6.39	23 25.1
	26	13	42	17.49	+15.552	- 9	22	49.8	-104.65	0.142 2585	+1178.4	2.41	6.34	23 27.4
	27	13	48	30.66	15.546	10	4	27.6	103.48	0.144 9528	1067.8	2.39	6.30	23 29.6
	28	13	54	43.72	15.542	10	45	36.0	102.19	0.147 3883	962.6	2.38	6.27	23 31.9
	29	14	0	56.69	15.540	11	26	12.0	100.79	0.149 5771	862.2	2.37	6.24	23 34.2
	30	14	7	9.65	15.541	12	6	13.0	99.28	0.151 5302	766.1	2.35	6.21	23 36.5
	31	14	13	22.67	+15.545	-12	45	36.7	- 97.68	0.153 2575	+ 674.0	2.34	6.18	23 38.8
Nov.	1	14	19	35.83	15.553	13	24	20.9	95.99	0.154 7682	585.4	2.34	6.16	23 41.0
	2	14	25	49.23	15.564	14	2	23.5	94.22	0.156 0700	500.0	2.33	6.14	23 43.3
	3	14	32	2.95	15.580	14	39	42.7	92.37	0.157 1702	417.2	2.33	6.13	23 45.6
	4	14	38	17.10	15.600	15	16	16.9	90.46	0.158 0748	337.1	2.32	6.11	23 47.9
	5	14	44	31.76	+15.623	-15	52	4.3	- 88.48	0.158 7899	+ 259.1	2.32	6.10	23 50.2
	6	14	50	47.04	15.651	16	27	3.4	86.44	0.159 3197	182.7	2.32	6.10	23 52.6
	7	14	57	3.03	15.682	17	1	12.7	84.33	0.159 6683	108.0	2.32	6.09	23 54.9
	8	15	3	19.81	15.717	17	34	30.8	82.17	0.159 8394	+ 34.8	2.32	6.09	23 57.3
	9	15	9	37.47	15.755	18	6	56.2	79.94	0.159 8359	- 37.7	2.32	6.09	23 59.6
	10	15	15	56.07	+15.796	-18	38	27.6	- 77.67	0.159 6593	- 109.3	2.32	6.09	. . . .
	11	15	22	15.71	15.841	19	9	3.7	75.33	0.159 3118	180.3	2.32	6.10	0 2.0
	12	15	28	36.44	15.887	19	38	42.9	72.93	0.158 7942	250.9	2.32	6.10	0 4.4
	13	15	34	58.32	15.936	20	7	24.1	70.49	0.158 1074	321.5	2.32	6.11	0 6.9
	14	15	41	21.38	15.966	20	35	6.0	67.99	0.157 2508	392.3	2.33	6.13	0 9.3
	15	15	47	45.67	+16.038	-21	1	47.0	- 65.42	0.156 2242	- 463.3	2.34	6.14	0 11.8
	16	15	54	11.21	+16.090	-21	27	25.8	- 62.60	0.155 0265	- 534.9	2.34	6.16	0 14.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"			"	"	h	m
Nov.	16	15	54	11.21	+16.090	-21	27	25.8	-62.80	0.155 0265	- 534.9	2.34	6.16	0 14.3
	17	16	0	38.01	16.143	21	52	1.2	60.14	0.153 6561	607.3	2.35	6.18	0 16.8
	18	16	7	6.08	16.195	22	15	31.9	57.41	0.152 1107	680.7	2.35	6.20	0 19.3
	19	16	13	35.38	16.246	22	37	56.2	54.61	0.150 3880	755.1	2.36	6.22	0 21.9
	20	16	20	5.90	16.296	22	59	12.9	51.77	0.148 4848	831.2	2.37	6.25	0 24.4
	21	16	26	37.59	+16.344	-23	19	20.7	-48.86	0.146 3970	- 908.8	2.38	6.28	0 27.0
	22	16	33	10.37	16.388	23	38	17.9	45.89	0.144 1209	988.3	2.39	6.31	0 29.6
	23	16	39	44.17	16.428	23	56	3.2	42.87	0.141 6515	1069.9	2.41	6.35	0 32.3
	24	16	46	18.87	16.463	24	12	35.3	39.79	0.138 9834	1154.0	2.43	6.39	0 34.9
	25	16	52	54.35	16.492	24	27	52.8	36.65	0.136 1100	1240.8	2.44	6.43	0 37.6
	26	16	59	30.45	+16.515	-24	41	54.0	-33.44	0.133 0253	-1330.4	2.46	6.48	0 40.2
	27	17	6	6.99	16.529	24	54	37.7	30.19	0.129 7214	1423.4	2.48	6.53	0 42.9
28	17	12	43.74	16.532	25	6	2.6	26.87	0.126 1902	1520.0	2.49	6.58	0 45.6	
29	17	19	20.45	16.525	25	16	7.1	23.50	0.122 4225	1620.4	2.52	6.64	0 48.2	
30	17	25	56.84	16.505	25	24	50.3	20.08	0.118 4087	1725.1	2.54	6.70	0 50.9	
Dec.	1	17	32	32.57	+16.470	-25	32	10.6	-16.60	0.114 1381	-1834.5	2.57	6.77	0 53.6
	2	17	39	7.24	16.417	25	38	7.0	13.09	0.109 5991	1948.9	2.60	6.84	0 56.2
	3	17	45	40.43	16.345	25	42	38.5	9.53	0.104 7794	2068.5	2.62	6.91	0 58.8
	4	17	52	11.61	16.250	25	45	44.1	5.94	0.099 6659	2193.9	2.66	6.99	1 1.4
	5	17	58	40.24	16.130	25	47	23.2	- 2.32	0.094 2438	2325.4	2.69	7.08	1 3.9
	6	18	5	5.63	+15.981	-25	47	35.1	+ 1.32	0.088 4990	-2463.2	2.73	7.18	1 6.4
	7	18	11	27.07	15.799	25	46	19.6	4.97	0.082 4150	2607.9	2.77	7.28	1 8.8
	8	18	17	43.70	15.580	25	43	36.6	8.61	0.075 9754	2759.6	2.81	7.39	1 11.2
	9	18	23	54.57	15.319	25	39	26.5	12.23	0.069 1633	2918.5	2.85	7.50	1 13.4
	10	18	29	58.60	15.009	25	33	50.0	15.81	0.061 9610	3084.6	2.89	7.63	1 15.5
	11	18	35	54.55	+14.645	-25	26	48.3	+19.32	0.054 3512	-3258.1	2.94	7.76	1 17.5
	12	18	41	41.05	14.219	25	18	23.2	22.75	0.046 3164	3438.6	3.00	7.91	1 19.3
	13	18	47	16.52	13.724	25	8	37.2	26.07	0.037 8408	3626.5	3.06	8.06	1 21.0
	14	18	52	39.19	13.151	24	57	33.2	29.24	0.028 9096	3817.9	3.12	8.23	1 22.4
	15	18	57	47.05	12.489	24	45	15.3	32.21	0.019 5114	4014.6	3.19	8.41	1 23.6
	16	19	2	37.88	+11.729	-24	31	48.7	+34.96	0.009 6378	-4213.6	3.26	8.61	1 24.4
	17	19	7	9.17	10.859	24	17	19.2	37.44	9.999 2866	4412.0	3.34	8.81	1 25.0
	18	19	11	18.16	9.869	24	1	54.1	39.60	9.988 4635	4606.1	3.43	9.04	1 25.2
	19	19	15	1.82	8.747	23	45	41.5	41.38	9.977 1843	4791.2	3.52	9.27	1 24.9
	20	19	18	16.86	7.482	23	28	51.2	42.74	9.965 4778	4961.0	3.62	9.53	1 24.2
	21	19	20	59.78	+ 6.069	-23	11	33.8	+43.62	9.953 3897	-5107.9	3.72	9.80	1 22.9
	22	19	23	6.94	4.502	22	54	1.3	44.00	9.940 9859	5222.4	3.82	10.08	1 21.1
	23	19	24	34.68	2.784	22	36	26.1	43.84	9.928 3572	5293.3	3.94	10.38	1 18.6
	24	19	25	19.44	+ 0.924	22	19	1.4	43.12	9.915 6228	5308.2	4.06	10.69	1 15.4
	25	19	25	18.07	- 1.057	22	2	0.6	41.86	9.902 9333	5253.6	4.17	11.00	1 11.4
	26	19	24	28.02	- 3.125	-21	45	36.2	+40.07	9.890 4724	-5115.5	4.30	11.32	1 6.6
	27	19	22	47.77	5.231	21	30	0.1	37.86	9.878 4563	4880.9	4.42	11.64	1 0.9
	28	19	20	17.14	7.310	21	15	22.0	35.25	9.867 1291	4540.2	4.54	11.95	0 54.5
	29	19	16	57.72	9.283	21	1	50.3	32.35	9.856 7527	4088.1	4.65	12.24	0 47.2
	30	19	12	53.11	11.063	20	49	31.0	29.24	9.847 5942	3526.1	4.74	12.50	0 39.2
	31	19	8	9.10	-12.551	-20	38	28.0	+25.90	9.839 9078	-2863.9	4.83	12.72	0 30.6
	32	19	2	53.57	...	-20	28	44.2	...	9.833 9126	...	4.90	12.90	0 21.4



## FOR GREENWICH MEAN NOON.

Data.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.			
		°	'	"	°	'	"	°	'	"	'	"			
Feb.	16	231	27	43.4	2	51	56.8	+ 1	50.9	-0	30	17.3	-21 4.0	9.658 8892	+23098
	17	234	18	48.3	2	50	15.4	3	6.6	0	51	12.1	20 45.4	9.661 0663	20446
	18	237	8	18.8	2	48	48.0	4	19.7	1	11	47.6	20 25.4	9.662 9788	17805
	19	239	56	28.8	2	47	34.2	5	29.8	1	32	2.6	20 4.5	9.664 6276	15173
	20	242	43	31.6	2	46	33.6	6	36.2	1	51	56.2	19 42.4	9.666 0137	12550
	21	245	29	40.4	2	45	46.0	+ 7	38.5	-2	11	27.1	-19 19.2	9.667 1379	+ 9935
	22	248	15	7.9	2	45	11.0	8	36.3	2	30	34.4	18 55.2	9.668 0009	7326
	23	251	0	6.7	2	44	48.6	9	29.1	2	49	17.1	18 30.0	9.668 6033	4722
	24	253	44	49.3	2	44	38.6	10	16.5	3	7	34.1	18 3.8	9.668 9454	+ 2120
	25	256	29	27.9	2	44	40.6	10	58.3	3	25	24.2	17 36.3	9.669 0274	- 480
	26	259	14	14.7	2	44	55.0	+11	34.0	-3	42	46.3	-17 7.7	9.668 8495	- 3080
	27	261	59	22.0	2	45	21.6	12	3.3	3	59	39.2	16 37.8	9.668 4114	5684
Mar.	28	264	45	1.9	2	46	0.4	12	26.0	4	16	1.5	16 6.6	9.667 7127	8289
	1	267	31	26.9	2	46	51.6	12	41.9	4	31	51.9	15 33.8	9.666 7534	10900
	2	270	18	49.2	2	47	55.2	12	50.6	4	47	8.6	14 59.4	9.665 5325	13518
	3	273	7	21.7	2	49	11.8	+12	52.0	-5	1	50.0	-14 23.2	9.664 0494	-16145
	4	275	57	17.2	2	50	41.4	12	45.8	5	15	54.2	13 44.8	9.662 3032	18780
	5	278	48	48.8	2	52	24.2	12	32.1	5	29	19.0	13 4.4	9.660 2931	21425
	6	281	42	10.1	2	54	20.7	12	10.6	5	42	2.2	12 21.5	9.658 0179	24080
	7	284	37	34.9	2	56	31.3	11	41.4	5	54	1.1	11 35.9	9.655 4767	26746
	8	287	35	17.6	2	56	56.6	+11	4.3	-6	5	13.0	-10 47.3	9.652 6684	-29420
	9	290	35	33.0	3	1	36.8	10	19.6	6	15	34.6	9 55.4	9.649 5925	32102
	10	293	38	36.4	3	4	32.7	9	27.2	6	25	2.7	9 0.0	9.646 2479	34790
	11	296	44	43.8	3	7	44.8	8	27.4	6	33	33.4	8 0.6	9.642 6345	37478
	12	299	54	11.7	3	11	13.8	7	20.4	6	41	2.5	6 56.8	9.638 7525	40162
	13	303	7	17.3	3	15	0.3	+ 6	6.8	-6	47	25.5	- 5 48.3	9.634 6025	-42838
	14	306	24	18.4	3	19	5.1	4	46.9	6	52	37.4	4 34.6	9.630 1855	45498
	15	309	45	33.8	3	23	28.8	3	21.5	6	56	32.8	3 15.2	9.625 5038	48130
	16	313	11	22.6	3	28	12.2	1	51.3	6	59	5.8	1 49.6	9.620 5608	50722
	17	316	42	4.9	3	33	15.8	+ 0	17.4	7	0	9.9	- 0 17.5	9.615 3612	53260
	18	320	18	1.3	3	38	40.6	- 1	19.1	-6	59	38.4	+ 1 21.8	9.609 9111	-55727
	19	323	59	33.3	3	44	27.0	2	56.8	6	57	23.9	3 8.5	9.604 2190	58098
	20	327	47	2.6	3	50	35.3	4	34.2	6	53	18.7	5 3.4	9.598 2956	60348
	21	331	40	51.4	3	57	6.2	6	9.2	6	47	14.4	7 6.5	9.592 1544	62447
	22	335	41	22.4	4	3	59.6	7	39.9	6	39	2.8	9 18.4	9.585 8125	64358
	23	339	48	58.0	4	11	15.4	- 9	4.0	-6	28	35.0	+11 38.7	9.579 2905	-66041
	24	344	4	0.5	4	18	53.1	10	18.9	6	15	42.6	14 7.6	9.572 6137	67444
	25	348	26	51.2	4	26	51.8	11	21.9	6	0	17.1	16 44.8	9.565 8129	68514
	26	352	57	50.7	4	35	10.1	12	10.4	5	42	10.6	19 29.4	9.558 9239	69197
	27	357	37	17.3	4	43	45.8	12	41.4	5	21	16.3	22 20.2	9.551 9888	69422
	28	2	25	27.2	4	52	36.2	-12	52.3	-4	57	28.7	+25 15.5	9.545 0572	-69118
	29	7	22	33.2	5	1	37.3	12	41.0	4	30	44.5	28 13.0	9.538 1854	68212
	30	12	28	43.8	5	10	44.4	12	5.5	4	1	2.8	31 9.8	9.531 4373	66634
	31	17	44	2.2	5	19	51.9	11	4.9	3	28	26.4	34 2.0	9.524 8834	64314
Apr.	1	23	8	25.4	5	28	52.8	9	39.2	2	53	1.8	36 45.2	9.518 6012	61194
	2	28	41	42.7	5	37	38.6	- 7	49.5	-2	15	0.7	+39 14.2	9.512 6731	-57222
	3	34	23	34.8	5	46	0.8	- 5	38.7	-1	34	40.0	+41 23.4	9.507 1862	-52370



MERCURY, 1917.  
FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.			Reduction to Orbit.			Heliocentric Latitude.			Var. per Day.			Logarithm of Radius Vector.			Var. per Day.		
		°	'	"	°	'	"	'	"	°	'	"	'	"								
Apr.	1	23	8	25.4	5	28	52.8	-	9	39.2	-2	53	1.8	+36	45.2	9.518 6012		-61194				
	2	28	41	42.7	5	37	38.6		7	49.5	2	15	0.7	39	14.2	9.512 6731		57222				
	3	34	23	34.8	5	46	0.8		5	38.7	1	34	40.0	41	23.4	9.507 1862		52370				
	4	40	13	33.0	5	53	49.1		3	10.8	0	52	22.4	43	7.1	9.502 2282		46645				
	5	46	10	58.2	6	0	53.0	-	0	31.6	-0	8	36.3	44	19.4	9.497 8854		40075				
	6	52	15	0.8	6	7	2.0	+	2	11.9	+0	36	4.1	+44	55.0	9.494 2393		-32728				
	7	58	24	40.4	6	12	5.6		4	51.8	1	21	0.1	44	50.0	9.491 3624		24707				
	8	64	38	47.1	6	15	54.6		7	19.8	2	5	29.7	44	1.8	9.489 3156		16157				
	9	70	56	2.1	6	18	21.2		9	27.8	2	48	49.0	42	29.6	9.488 1429		- 7252				
	10	77	15	0.1	6	19	20.0		11	8.7	3	30	14.6	40	14.8	9.487 8708		+ 1818				
	11	83	34	11.7	6	18	48.0	+	12	17.1	+4	9	5.3	+37	20.6	9.488 5052		+10847				
	12	89	52	5.7	6	16	45.0		12	49.7	4	44	44.5	33	52.8	9.490 0321		19633				
	13	96	7	12.6	6	13	14.6		12	45.3	5	16	41.7	29	57.8	9.492 4174		27988				
	14	102	18	7.6	6	8	22.3		12	5.2	5	44	33.7	25	43.6	9.495 6101		35755				
	15	108	23	32.7	6	2	16.5		10	53.1	6	8	5.1	21	18.0	9.499 5443		42801				
	16	114	22	19.3	5	55	7.0	+	9	13.7	+6	27	8.6	+16	48.9	9.504 1433		+49040				
	17	120	13	29.1	5	47	5.0		7	13.3	6	41	44.0	12	23.0	9.509 3235		54418				
	18	125	56	15.7	5	38	22.3		4	58.6	6	51	57.8	8	6.4	9.514 9974		58914				
	19	131	30	3.9	5	29	10.2		2	36.0	6	58	1.5	4	3.6	9.521 0773		62542				
	20	136	54	29.9	5	19	39.6	+	0	11.9	7	0	10.8	+ 0	17.9	9.527 4780		65336				
	21	142	9	20.0	5	9	59.9	-	2	8.4	+6	58	43.8	- 3	8.6	9.534 1185		+67350				
	22	147	14	29.6	5	0	20.0		4	20.4	6	54	0.5	6	14.7	9.540 9243		68652				
	23	152	10	2.2	4	50	46.8		6	20.6	6	46	21.2	9	0.4	9.547 8272		69305				
	24	156	56	7.5	4	41	26.3		8	6.4	6	36	6.3	11	26.2	9.554 7663		69388				
	25	161	33	0.6	4	32	23.0		9	36.1	6	23	35.3	13	32.7	9.561 6883		68974				
	26	166	1	0.4	4	23	40.2	-	10	48.8	+6	9	6.8	-15	21.5	9.568 5468		+68130				
	27	170	20	28.7	4	15	20.5		11	44.4	5	52	57.7	16	54.0	9.575 3020		66917				
	28	174	31	49.6	4	7	25.4		12	23.0	5	35	23.8	18	11.6	9.581 9200		65396				
	29	178	35	28.0	3	59	55.8		12	45.3	5	16	39.0	19	15.9	9.588 3727		63617				
	30	182	31	49.7	3	52	52.1		12	52.3	4	56	56.0	20	8.4	9.594 6364		61627				
May	1	186	21	20.8	3	46	14.3	-	12	45.2	+4	36	25.8	-20	50.4	9.600 6923		+59464				
	2	190	4	26.8	3	40	2.0		12	25.2	4	15	18.2	21	23.4	9.606 5246		57162				
	3	193	41	33.0	3	34	14.6		11	53.6	3	53	41.8	21	48.2	9.612 1210		54749				
	4	197	13	3.9	3	28	51.2		11	11.9	3	31	44.0	22	6.2	9.617 4716		52252				
	5	200	39	23.3	3	23	51.4		10	21.3	3	9	31.3	22	18.2	9.622 5692		49690				
	6	204	0	54.0	3	19	13.8	-	9	23.2	+2	47	9.2	-22	25.1	9.627 4080		+47079				
	7	207	17	57.9	3	14	57.6		8	18.9	2	24	42.6	22	27.4	9.631 9839		44436				
	8	210	30	55.9	3	11	1.8		7	9.5	2	2	15.6	22	25.9	9.636 2944		41769				
	9	213	40	8.0	3	7	25.6		5	56.2	1	39	51.9	22	21.0	9.640 3372		39088				
	10	216	45	53.3	3	4	8.1		4	39.9	1	17	34.4	22	13.4	9.644 1117		36400				
	11	219	48	30.2	3	1	8.5	-	3	21.7	+0	55	25.9	-22	3.2	9.647 6173		+33713				
	12	222	48	16.0	2	58	26.0		2	2.5	0	33	28.7	21	50.8	9.650 8544		31028				
	13	225	45	27.5	2	55	59.7	-	0	43.1	+0	11	44.9	21	36.6	9.653 8230		28348				
	14	228	40	20.6	2	53	49.1	+	0	35.7	-0	9	44.0	21	20.8	9.656 5244		25679				
	15	231	33	10.7	2	51	53.6		1	53.3	0	30	56.2	21	3.4	9.658 9591		23018				
	16	234	24	12.6	2	50	12.6	+	3	8.9	-0	51	50.3	-20	44.7	9.661 1283		+20367				
	17	237	13	40.5	2	48	45.4	+	4	21.9	-1	12	25.2	-20	24.9	9.663 0328		+17725				

FOR

MEAN NOON





**FOR**

**MEAN NOON.**

**VENUS, 1917.**  
**GREENWICH MEAN TIME.**

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Apr.	1	0	19 42.77	+11.353	+	0	35 16.1	+74.91	0.233 1819	+144.7	5.00	5.14	23 43.2
	2	0	24 15.22	11.352		1	5 13.8	74.89	0.233 5234	139.9	5.00	5.14	23 43.8
	3	0	28 47.66	11.352		1	35 10.8	74.85	0.233 8532	135.0	5.00	5.14	23 44.4
	4	0	33 20.15	11.355		2	5 6.5	74.78	0.234 1712	130.1	4.99	5.13	23 45.0
	5	0	37 52.73	11.360		2	35 0.2	74.68	0.234 4775	125.1	4.99	5.13	23 45.6
	6	0	42 25.44	+11.366	+	3	4 51.1	+74.55	0.234 7719	+120.2	4.98	5.12	23 46.2
	7	0	46 58.31	11.374		3	34 38.5	74.39	0.235 0545	115.3	4.98	5.12	23 46.8
	8	0	51 31.40	11.384		4	4 21.8	74.21	0.235 3253	110.4	4.98	5.12	23 47.5
	9	0	56 4.75	11.395		4	34 0.3	73.99	0.235 5842	105.4	4.98	5.12	23 48.1
	10	1	0 38.39	11.409		5	3 33.2	73.74	0.235 8311	100.4	4.97	5.11	23 48.7
	11	1	5 12.38	+11.424	+	5	32 59.7	+73.46	0.236 0659	+ 95.3	4.97	5.11	23 49.3
	12	1	9 46.76	11.441		6	2 19.3	73.16	0.236 2885	90.2	4.97	5.11	23 50.0
	13	1	14 21.56	11.459		6	31 31.2	72.82	0.236 4989	85.1	4.96	5.10	23 50.6
	14	1	18 56.82	11.479		7	0 34.6	72.45	0.236 6968	79.8	4.96	5.10	23 51.3
	15	1	23 32.59	11.501		7	29 28.8	72.06	0.236 8821	74.6	4.96	5.10	23 51.9
	16	1	28 8.90	+11.525	+	7	58 13.1	+71.63	0.237 0547	+ 69.2	4.96	5.10	23 52.6
	17	1	32 45.79	11.550		8	26 46.8	71.17	0.237 2144	63.9	4.96	5.10	23 53.3
	18	1	37 23.30	11.576		8	55 9.1	70.68	0.237 3612	58.5	4.95	5.09	23 54.0
	19	1	42 1.45	11.604		9	23 19.3	70.16	0.237 4950	53.0	4.95	5.09	23 54.7
	20	1	46 40.29	11.633		9	51 16.6	69.61	0.237 6156	47.5	4.95	5.09	23 55.4
	21	1	51 19.84	+11.663	+10	19 0.3	+69.03	0.237 7229	+ 41.9	4.95	5.09	5.09	23 56.1
	22	1	56 0.14	11.695		10	46 29.6	68.41	0.237 8169	36.4	4.95	5.09	23 56.9
	23	2	0 41.22	11.728		11	13 43.8	67.77	0.237 8975	30.8	4.95	5.09	23 57.6
	24	2	5 23.10	11.762		11	40 42.1	67.09	0.237 9647	25.2	4.95	5.09	23 58.4
	25	2	10 5.82	11.797		12	7 23.8	66.38	0.238 0184	19.6	4.95	5.09	23 59.2
	26	2	14 49.39	+11.834	+12	33 48.1	+65.64	0.238 0586	+ 14.0	4.95	5.09	5.09	...
	27	2	19 33.86	11.872		12	59 54.3	64.87	0.238 0854	8.4	4.95	5.09	0 0.0
	28	2	24 19.24	11.910		13	25 41.7	64.07	0.238 0988	+ 2.8	4.95	5.09	0 0.8
	29	2	29 5.56	11.950		13	51 9.5	63.24	0.238 0987	- 2.9	4.95	5.09	0 1.6
	30	2	33 52.85	11.991		14	16 17.0	62.38	0.238 0851	8.5	4.95	5.09	0 2.5
May	1	2	38 41.12	+12.032	+14	41 3.4	+61.48	0.238 0580	- 14.1	4.95	5.09	5.09	0 3.3
	2	2	43 30.40	12.075		15	5 28.0	60.56	0.238 0175	19.7	4.95	5.09	0 4.2
	3	2	48 20.72	12.118		15	29 30.1	59.61	0.237 9634	25.4	4.95	5.09	0 5.1
	4	2	53 12.08	12.162		15	53 8.9	58.62	0.237 8958	31.0	4.95	5.09	0 6.0
	5	2	58 4.50	12.207		16	16 23.7	57.61	0.237 8146	36.6	4.95	5.09	0 6.9
	6	3	2 58.01	+12.252	+16	39 13.8	+56.56	0.237 7199	- 42.3	4.95	5.09	5.09	0 7.9
	7	3	7 52.60	12.298		17	1 38.5	55.49	0.237 6115	48.0	4.95	5.09	0 8.9
	8	3	12 48.31	12.344		17	23 37.0	54.38	0.237 4894	53.7	4.95	5.09	0 9.9
	9	3	17 45.13	12.391		17	45 8.6	53.25	0.237 3536	59.4	4.95	5.09	0 10.9
	10	3	22 43.08	12.438		18	6 12.6	52.08	0.237 2040	65.2	4.96	5.10	0 11.9
	11	3	27 42.17	+12.486	+18	26 48.3	+50.89	0.237 0404	- 71.1	4.96	5.10	5.10	0 12.9
	12	3	32 42.39	12.533		18	46 54.9	49.66	0.236 8628	76.9	4.96	5.10	0 14.0
	13	3	37 43.74	12.580		19	6 31.8	48.41	0.236 6710	82.9	4.96	5.10	0 15.1
	14	3	42 46.23	12.627		19	25 38.2	47.12	0.236 4649	88.9	4.96	5.10	0 16.2
	15	3	47 49.85	12.674		19	44 13.5	45.81	0.236 2444	94.9	4.97	5.11	0 17.3
	16	3	52 54.59	+12.721	+20	2 17.0	+44.47	0.236 0092	-101.1	4.97	5.11	5.11	0 18.4
	17	3	58 0.44	+12.767	+20	19 48.0	+43.10	0.235 7593	-107.2	4.97	5.11	5.11	0 19.6

**GREENWICH MEAN TIME.**

1

2

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.	
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.		
	h	m	s	s	°	'	"	"			"	"	h m	
July	1	7	56	23.34	+12.989	+22	10	3.0	-32.51	0.208 4622	-404.5	5.29	5.44	1 20.6
	2	8	1	34.55	12.945	21	56	43.9	34.08	0.207 4831	411.4	5.31	5.46	1 21.8
	3	8	6	44.69	12.900	21	42	47.3	35.63	0.206 4876	418.2	5.32	5.47	1 23.1
	4	8	11	53.73	12.853	21	28	13.7	37.16	0.205 4756	425.1	5.33	5.48	1 24.3
	5	8	17	1.64	12.806	21	13	3.7	38.67	0.204 4473	431.9	5.35	5.50	1 25.5
	6	8	22	8.40	+12.757	+20	57	17.7	-40.16	0.203 4027	-438.7	5.36	5.51	1 26.6
	7	8	27	13.99	12.708	20	40	56.4	41.61	0.202 3416	445.5	5.37	5.52	1 27.8
	8	8	32	18.38	12.658	20	24	0.4	43.05	0.201 2641	452.4	5.38	5.54	1 28.9
	9	8	37	21.56	12.607	20	6	30.2	44.46	0.200 1701	459.3	5.39	5.55	1 30.0
	10	8	42	23.53	12.556	19	48	26.6	45.84	0.199 0595	466.2	5.40	5.56	1 31.1
	11	8	47	24.26	+12.504	+19	29	50.0	-47.20	0.197 9323	-473.2	5.42	5.58	1 32.2
	12	8	52	23.74	12.453	19	10	41.3	48.53	0.196 7883	480.2	5.43	5.59	1 33.2
	13	8	57	21.98	12.401	18	51	1.0	49.83	0.195 6275	487.2	5.45	5.61	1 34.3
	14	9	2	18.96	12.348	18	30	49.8	51.10	0.194 4497	494.3	5.46	5.62	1 35.3
	15	9	7	14.67	12.295	18	10	8.4	52.34	0.193 2548	501.4	5.48	5.64	1 36.2
	16	9	12	9.13	+12.243	+17	48	57.5	-53.56	0.192 0428	-508.6	5.49	5.65	1 37.2
	17	9	17	2.32	12.190	17	27	17.8	54.74	0.190 8135	515.8	5.51	5.67	1 38.1
	18	9	21	54.25	12.137	17	5	10.0	55.90	0.189 5669	523.0	5.53	5.69	1 39.1
	19	9	26	44.92	12.085	16	42	34.8	57.03	0.188 3029	530.3	5.54	5.70	1 40.0
	20	9	31	34.33	12.033	16	19	33.0	58.12	0.187 0215	537.5	5.56	5.72	1 40.9
	21	9	36	22.50	+11.981	+15	56	5.3	-59.19	0.185 7227	-544.8	5.58	5.74	1 41.7
	22	9	41	9.44	11.930	15	32	12.3	60.22	0.184 4064	552.1	5.59	5.75	1 42.6
	23	9	45	55.15	11.879	15	7	54.9	61.22	0.183 0726	559.4	5.61	5.77	1 43.4
	24	9	50	39.66	11.830	14	43	13.8	62.20	0.181 7213	566.7	5.63	5.79	1 44.2
	25	9	55	22.97	11.780	14	18	9.7	63.14	0.180 3525	574.0	5.65	5.81	1 44.9
	26	10	0	5.09	+11.731	+13	52	43.4	-64.05	0.178 9662	-581.3	5.67	5.83	1 45.7
	27	10	4	46.06	11.683	13	26	55.6	64.93	0.177 5624	588.5	5.69	5.85	1 46.4
	28	10	9	25.89	11.636	13	0	47.0	65.78	0.176 1412	595.8	5.71	5.87	1 47.2
	29	10	14	4.60	11.590	12	34	18.4	66.60	0.174 7025	603.1	5.72	5.88	1 47.9
	30	10	18	42.22	11.545	12	7	30.4	67.39	0.173 2464	610.3	5.73	5.90	1 48.5
	31	10	23	18.77	+11.501	+11	40	23.9	-68.15	0.171 7730	-617.5	5.75	5.92	1 49.2
Aug.	1	10	27	54.28	11.458	11	12	59.5	68.88	0.170 2825	624.6	5.78	5.95	1 49.9
	2	10	32	28.78	11.417	10	45	17.9	69.58	0.168 7748	631.8	5.80	5.97	1 50.5
	3	10	37	2.30	11.377	10	17	19.9	70.25	0.167 2500	638.9	5.82	5.99	1 51.1
	4	10	41	34.87	11.338	9	49	6.2	70.89	0.165 7081	646.0	5.84	6.01	1 51.7
	5	10	46	6.54	+11.301	+ 9	20	37.4	-71.51	0.164 1491	-653.1	5.86	6.03	1 52.3
	6	10	50	37.33	11.265	8	51	54.2	72.09	0.162 5730	660.3	5.88	6.05	1 52.9
	7	10	55	7.29	11.231	8	22	57.3	72.64	0.160 9798	667.5	5.90	6.07	1 53.4
	8	10	59	36.44	11.198	7	53	47.5	73.17	0.159 3692	674.7	5.93	6.10	1 54.0
	9	11	4	4.83	11.167	7	24	25.4	73.67	0.157 7413	682.0	5.95	6.12	1 54.5
	10	11	8	32.49	+11.138	+ 6	54	51.7	-74.14	0.156 0958	-689.3	5.97	6.14	1 55.0
	11	11	12	59.46	11.110	6	25	7.1	74.57	0.154 4326	696.7	6.00	6.17	1 55.5
	12	11	17	25.78	11.083	5	55	12.4	74.98	0.152 7517	704.1	6.02	6.19	1 56.0
	13	11	21	51.48	11.059	5	25	8.2	75.36	0.151 0530	711.5	6.04	6.21	1 56.5
	14	11	26	16.61	11.036	4	54	55.2	75.72	0.149 3363	719.0	6.07	6.24	1 57.0
	15	11	30	41.20	+11.014	+ 4	24	34.1	-76.03	0.147 6015	-726.6	6.08	6.26	1 57.4
	16	11	35	5.28	+10.993	+ 3	54	5.8	-76.32	0.145 8484	-734.2	6.11	6.29	1 57.9

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.		
	Noon.				Noon.									Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h	m	
ig.	16	11	35	5.28	+10.993	+	3 54	5.8	-76.32	0.145 8484	- 784.2	6.11	6.29	1 57.9	
	17	11	39	28.90	10.975		3 23	30.8	76.59	0.144 0771	741.9	6.14	6.32	1 58.4	
	18	11	43	52.09	10.958		2 52	49.9	76.82	0.142 2874	749.6	6.16	6.34	1 58.8	
	19	11	48	14.90	10.943		2 22	3.8	77.02	0.140 4791	757.3	6.19	6.37	1 59.2	
	20	11	52	37.36	10.929		1 51	13.2	77.19	0.138 6522	765.1	6.21	6.39	1 59.7	
	21	11	56	59.51	+10.917	+	1 20	18.8	-77.34	0.136 8066	- 772.9	6.24	6.42	2 0.1	
	22	12	1	21.38	10.906		0 49	21.3	77.45	0.134 9422	780.8	6.27	6.45	2 0.5	
	23	12	5	43.02	10.897	+	0 18	21.3	77.54	0.133 0589	788.6	6.30	6.48	2 0.9	
	24	12	10	4.47	10.890	-	0 12	40.4	77.59	0.131 1568	796.5	6.33	6.51	2 1.3	
	25	12	14	25.76	10.884		0 43	43.0	77.62	0.129 2357	804.4	6.35	6.53	2 1.8	
	26	12	18	46.93	+10.880	-	1 14	46.0	-77.62	0.127 2957	- 812.2	6.38	6.56	2 2.2	
	27	12	23	8.03	10.878		1 45	48.6	77.59	0.125 3369	820.1	6.41	6.59	2 2.6	
	28	12	27	29.08	10.877		2 16	50.1	77.53	0.123 3591	828.0	6.43	6.62	2 3.0	
	29	12	31	50.13	10.878		2 47	49.8	77.44	0.121 3625	835.9	6.46	6.65	2 3.4	
	30	12	36	11.22	10.880		3 18	47.1	77.33	0.119 3469	843.7	6.49	6.68	2 3.8	
	pt.	31	12	40	32.39	+10.884	-	3 49	41.3	-77.18	0.117 3125	- 851.6	6.53	6.72	2 4.2
		1	12	44	53.68	10.890		4 20	31.7	77.01	0.115 2591	859.5	6.56	6.75	2 4.6
		2	12	49	15.14	10.898		4 51	17.6	76.81	0.113 1869	867.4	6.59	6.78	2 5.0
		3	12	53	36.81	10.908		5 21	58.4	76.58	0.111 0957	875.3	6.62	6.81	2 5.5
		4	12	57	58.72	10.919		5 52	33.4	76.33	0.108 9856	883.2	6.66	6.85	2 5.9
		5	13	2	20.93	+10.932	-	6 23	2.0	-76.05	0.106 8562	- 891.2	6.69	6.88	2 6.3
		6	13	6	43.46	10.946		6 53	23.5	75.74	0.104 7077	899.2	6.72	6.91	2 6.7
		7	13	11	6.37	10.963		7 23	37.2	75.40	0.102 5398	907.4	6.76	6.95	2 7.2
		8	13	15	29.70	10.981		7 53	42.3	75.03	0.100 3522	915.6	6.78	6.98	2 7.6
		9	13	19	53.47	11.000		8 23	38.2	74.63	0.098 1448	923.9	6.82	7.02	2 8.1
		10	13	24	17.73	+11.022	-	8 53	24.2	-74.20	0.095 9174	- 932.3	6.85	7.05	2 8.6
		11	13	28	42.52	11.044		9 22	59.6	73.74	0.093 6697	940.8	6.89	7.09	2 9.0
		12	13	33	7.87	11.068		9 52	23.7	73.26	0.091 4016	949.4	6.93	7.13	2 9.5
		13	13	37	33.81	11.093		10 21	35.7	72.74	0.089 1129	958.0	6.97	7.17	2 10.0
		14	13	42	0.37	11.120		10 50	34.9	72.19	0.086 8032	966.7	7.00	7.20	2 10.5
15		13	46	27.60	+11.149	-	11 19	20.7	-71.62	0.084 4725	- 975.6	7.04	7.24	2 11.0	
16		13	50	55.52	11.178		11 47	52.4	71.01	0.082 1204	984.5	7.08	7.28	2 11.5	
17		13	55	24.15	11.208		12 16	9.1	70.37	0.079 7468	993.5	7.12	7.32	2 12.1	
18		13	59	53.52	11.240		12 44	10.1	69.71	0.077 3514	1002.7	7.15	7.36	2 12.6	
19		14	4	23.66	11.272		13 11	54.8	69.01	0.074 9339	1011.9	7.19	7.40	2 13.2	
20		14	8	54.59	+11.306	-	13 39	22.3	-68.28	0.072 4943	-1021.2	7.24	7.45	2 13.7	
21		14	13	26.34	11.340		14 6	31.9	67.52	0.070 0322	1030.6	7.28	7.49	2 14.3	
22		14	17	58.92	11.375		14 33	23.0	66.73	0.067 5476	1040.0	7.32	7.53	2 14.9	
23		14	22	32.36	11.411		14 59	54.8	65.91	0.065 0403	1049.4	7.37	7.58	2 15.6	
24		14	27	6.67	11.448		15 26	6.6	65.06	0.062 5102	1059.0	7.41	7.62	2 16.2	
25		14	31	41.87	+11.485	-	15 51	57.6	-64.18	0.059 9570	-1068.7	7.45	7.67	2 16.8	
26		14	36	17.97	11.523		16 17	27.1	63.27	0.057 3806	1078.4	7.49	7.71	2 17.5	
27		14	40	54.99	11.562		16 42	34.4	62.33	0.054 7809	1088.1	7.54	7.76	2 18.2	
28		14	45	32.95	11.601		17 7	18.8	61.36	0.052 1579	1097.8	7.58	7.80	2 18.9	
29		14	50	11.84	11.640		17 31	39.5	60.36	0.049 5116	1107.5	7.63	7.85	2 19.6	
30	14	54	51.69	+11.680	-	17 55	35.9	-59.33	0.046 8417	-1117.3	7.68	7.90	2 20.3		
ct.	1	14	59	32.50	+11.721	-	18 19	7.3	-58.28	0.044 1483	-1127.2	7.73	7.95	2 21.0	



GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ' "	"			"	"	h m
Oct.	1	14 59 32.50	+11.721	-18 19 7.3	-58.28	0.044 1483	-1127.2	7.73	7.95	2 21.0
	2	15 4 14.29	11.761	18 42 13.0	57.19	0.041 4312	1137.1	7.78	8.00	2 21.8
	3	15 8 57.05	11.802	19 4 52.2	56.08	0.038 6900	1147.2	7.82	8.05	2 22.5
	4	15 13 40.80	11.844	19 27 4.4	54.93	0.035 9247	1157.3	7.87	8.10	2 23.3
	5	15 18 25.54	11.885	19 48 48.8	53.76	0.033 1349	1167.5	7.92	8.15	2 24.2
	6	15 23 11.26	+11.926	-20 10 4.8	-52.56	0.030 3204	-1177.9	7.98	8.21	2 25.0
	7	15 27 57.97	11.967	20 30 51.5	51.33	0.027 4808	1188.4	8.03	8.26	2 25.8
	8	15 32 45.66	12.007	20 51 8.5	50.08	0.024 6158	1199.1	8.08	8.31	2 26.7
	9	15 37 34.32	12.048	21 10 55.0	48.80	0.021 7251	1209.9	8.14	8.37	2 27.5
	10	15 42 23.94	12.087	21 30 10.5	47.49	0.018 8082	1220.9	8.19	8.43	2 28.4
	11	15 47 14.51	+12.126	-21 48 54.1	-46.15	0.015 8648	-1232.0	8.24	8.48	2 29.3
	12	15 52 5.99	12.164	22 7 5.3	44.79	0.012 8944	1243.3	8.30	8.54	2 30.2
	13	15 56 58.37	12.201	22 24 43.5	43.40	0.009 8966	1254.8	8.36	8.60	2 31.2
	14	16 1 51.62	12.237	22 41 48.1	41.98	0.006 8710	1266.5	8.42	8.66	2 32.1
	15	16 6 45.72	12.271	22 58 18.3	40.54	0.003 8171	1278.4	8.48	8.72	2 33.1
	16	16 11 40.62	+12.304	-23 14 13.8	-39.08	0.000 7347	-1290.3	8.53	8.78	2 34.1
	17	16 16 36.31	12.336	23 29 33.9	37.59	9.997 6233	1302.5	8.60	8.85	2 35.1
	18	16 21 32.72	12.365	23 44 18.0	36.08	9.994 4824	1314.9	8.66	8.91	2 36.1
	19	16 26 29.83	12.393	23 58 25.6	34.55	9.991 3116	1327.5	8.73	8.98	2 37.1
	20	16 31 27.57	12.418	24 11 56.2	33.00	9.988 1104	1340.2	8.79	9.04	2 38.1
	21	16 36 25.90	+12.442	-24 24 49.4	-31.43	9.984 8785	-1353.1	8.85	9.11	2 39.1
	22	16 41 24.76	12.463	24 37 4.7	29.84	9.981 6155	1366.1	8.92	9.18	2 40.2
	23	16 46 24.09	12.481	24 48 41.7	28.24	9.978 3210	1379.3	8.99	9.25	2 41.2
	24	16 51 23.83	12.497	24 59 39.9	26.61	9.974 9948	1392.6	9.06	9.32	2 42.2
	25	16 56 23.93	12.511	25 9 59.0	24.97	9.971 6364	1406.1	9.13	9.39	2 43.3
	26	17 1 24.33	+12.522	-25 19 38.6	-23.32	9.968 2456	-1419.6	9.20	9.47	2 44.4
	27	17 6 24.95	12.530	25 28 38.5	21.66	9.964 8221	1433.3	9.27	9.54	2 45.4
	28	17 11 25.73	12.535	25 36 58.3	19.99	9.961 3658	1447.0	9.35	9.62	2 46.5
	29	17 16 26.60	12.537	25 44 37.8	18.30	9.957 8763	1460.9	9.43	9.70	2 47.6
	30	17 21 27.49	12.537	25 51 36.7	16.61	9.954 3532	1475.0	9.51	9.78	2 48.7
	31	17 26 28.34	+12.533	-25 57 54.9	-14.91	9.950 7963	-1489.2	9.58	9.86	2 49.7
Nov.	1	17 31 29.06	12.527	26 3 32.1	13.20	9.947 2051	1503.5	9.66	9.94	2 50.8
	2	17 36 29.60	12.517	26 8 28.3	11.48	9.943 5793	1518.0	9.74	10.02	2 51.9
	3	17 41 29.87	12.505	26 12 43.3	9.76	9.939 9183	1532.8	9.83	10.11	2 52.9
	4	17 46 29.80	12.489	26 16 17.0	8.04	9.936 2217	1547.7	9.90	10.19	2 54.0
	5	17 51 29.31	+12.470	-26 19 9.3	- 6.32	9.932 4890	-1562.9	9.99	10.28	2 55.0
	6	17 56 28.33	12.448	26 21 20.4	4.60	9.928 7195	1578.4	10.08	10.37	2 56.1
	7	18 1 26.78	12.422	26 22 50.2	2.88	9.924 9127	1594.0	10.17	10.46	2 57.1
	8	18 6 24.58	12.393	26 23 38.7	- 1.16	9.921 0680	1609.9	10.25	10.55	2 58.1
	9	18 11 21.63	12.361	26 23 46.1	+ 0.55	9.917 1847	1626.2	10.35	10.65	2 59.1
	10	18 16 17.86	+12.325	-26 23 12.5	+ 2.25	9.913 2622	-1642.7	10.45	10.75	3 0.1
	11	18 21 13.18	12.285	26 21 58.1	3.95	9.909 2997	1659.5	10.54	10.84	3 1.1
	12	18 26 7.50	12.241	26 20 3.0	5.64	9.905 2965	1676.6	10.63	10.94	3 2.1
	13	18 31 0.74	12.195	26 17 27.5	7.32	9.901 2520	1693.9	10.74	11.05	3 3.0
	14	18 35 52.81	12.144	26 14 11.9	8.98	9.897 1655	1711.5	10.84	11.15	3 3.9
	15	18 40 43.61	+12.089	-26 10 16.4	+10.63	9.893 0363	-1729.6	10.94	11.26	3 4.8
	16	18 45 33.07	+12.031	-26 5 41.6	+12.27	9.888 8634	-1747.9	11.05	11.37	3 5.7

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Nov. 16	18 45 33.07	+12.031	-26 5 41.6	+12.27	9.888 8634	-1747.9	11.05	11.37	3 5.7
17	18 50 21.07	11.969	26 0 27.6	13.89	9.884 6463	1766.5	11.16	11.48	3 6.6
18	18 55 7.54	11.903	25 54 35.0	15.49	9.880 3841	1785.4	11.27	11.59	3 7.4
19	18 59 52.39	11.833	25 48 4.3	17.07	9.876 0762	1804.6	11.38	11.71	3 8.2
20	19 4 35.51	11.760	25 40 55.9	18.63	9.871 7219	1824.0	11.49	11.82	3 9.0
21	19 9 16.82	+11.682	-25 33 10.4	+20.16	9.867 3207	-1843.7	11.61	11.94	3 9.7
22	19 13 56.23	11.601	25 24 48.3	21.67	9.862 8718	1863.7	11.73	12.07	3 10.4
23	19 18 33.64	11.516	25 15 50.3	23.16	9.858 3748	1883.8	11.85	12.19	3 11.1
24	19 23 8.97	11.428	25 6 16.9	24.62	9.853 8292	1904.2	11.98	12.32	3 11.7
25	19 27 42.14	11.336	24 56 8.8	26.06	9.849 2344	1924.8	12.10	12.45	3 12.3
26	19 32 13.06	+11.240	-24 45 26.6	+27.46	9.844 5900	-1945.6	12.24	12.59	3 12.9
27	19 36 41.64	11.141	24 34 11.0	28.84	9.839 8955	1966.5	12.36	12.72	3 13.4
28	19 41 7.82	11.040	24 22 22.7	30.18	9.835 1504	1987.7	12.50	12.86	3 13.9
29	19 45 31.52	10.935	24 10 2.5	31.50	9.830 3542	2009.1	12.65	13.01	3 14.4
30	19 49 52.65	10.826	23 57 11.0	32.79	9.825 5064	2030.7	12.78	13.15	3 14.8
Dec. 1	19 54 11.15	+10.715	-23 43 49.1	+34.04	9.820 6064	-2052.6	12.93	13.30	3 15.1
2	19 58 26.94	10.601	23 29 57.5	35.26	9.815 6536	2074.7	13.07	13.45	3 15.4
3	20 2 39.95	10.483	23 15 37.0	36.44	9.810 6474	2097.1	13.23	13.61	3 15.7
4	20 6 50.11	10.363	23 0 48.5	37.60	9.805 5871	2119.8	13.38	13.77	3 16.0
5	20 10 57.34	10.239	22 45 32.7	38.71	9.800 4721	2142.8	13.54	13.93	3 16.1
6	20 15 1.57	+10.113	-22 29 50.7	+39.79	9.795 3015	-2166.1	13.71	14.10	3 16.2
7	20 19 2.72	9.983	22 13 43.2	40.83	9.790 0748	2189.6	13.87	14.27	3 16.3
8	20 23 0.72	9.850	21 57 11.1	41.84	9.784 7912	2213.4	14.04	14.44	3 16.3
9	20 26 55.50	9.714	21 40 15.4	42.80	9.779 4500	2237.6	14.21	14.62	3 16.3
10	20 30 46.96	9.574	21 22 57.0	43.73	9.774 0504	2262.1	14.40	14.81	3 16.2
11	20 34 35.03	+ 9.431	-21 5 16.9	+44.61	9.768 5918	-2286.8	14.57	14.99	3 16.0
12	20 38 19.63	9.285	20 47 16.1	45.45	9.763 0735	2311.8	14.75	15.18	3 15.8
13	20 42 0.68	9.135	20 28 55.6	46.25	9.757 4948	2337.2	14.95	15.38	3 15.6
14	20 45 38.08	8.981	20 10 16.5	47.00	9.751 8549	2362.8	15.14	15.58	3 15.3
15	20 49 11.73	8.823	19 51 19.8	47.71	9.746 1534	2388.6	15.35	15.79	3 14.9
16	20 52 41.55	+ 8.661	-19 32 6.6	+48.37	9.740 3896	-2414.6	15.55	16.00	3 14.4
17	20 56 7.42	8.495	19 12 38.2	48.99	9.734 5632	2440.8	15.77	16.22	3 13.9
18	20 59 29.25	8.324	18 52 55.6	49.55	9.728 6738	2467.0	15.98	16.44	3 13.3
19	21 2 46.91	8.148	18 33 0.0	50.07	9.722 7214	2493.3	16.19	16.66	3 12.6
20	21 6 0.30	7.967	18 12 52.7	50.53	9.716 7059	2519.6	16.43	16.90	3 11.9
21	21 9 9.29	+ 7.781	-17 52 34.8	+50.95	9.710 6274	-2545.7	16.65	17.13	3 11.1
22	21 12 13.76	7.591	17 32 7.6	51.31	9.704 4865	2571.7	16.89	17.38	3 10.2
23	21 15 13.60	7.395	17 11 32.3	51.62	9.698 2835	2597.4	17.14	17.63	3 9.3
24	21 18 8.67	7.193	16 50 50.2	51.88	9.692 0193	2622.7	17.38	17.88	3 8.2
25	21 20 58.83	6.986	16 30 2.7	52.08	9.685 6947	2647.7	17.64	18.15	3 7.1
26	21 23 43.97	+ 6.774	-16 9 10.9	+52.23	9.679 3109	-2672.1	17.90	18.42	3 5.9
27	21 26 23.93	6.555	15 48 16.2	52.32	9.672 8692	2695.9	18.17	18.69	3 4.6
28	21 28 58.58	6.331	15 27 20.0	52.36	9.666 3713	2719.0	18.44	18.97	3 3.3
29	21 31 27.77	6.100	15 6 23.6	52.34	9.659 8186	2741.4	18.72	19.26	3 1.8
30	21 33 51.35	5.864	14 45 28.3	52.26	9.653 2132	2762.9	19.01	19.56	3 0.2
31	21 36 9.17	+ 5.620	-14 24 35.7	+52.12	9.646 5573	-2783.5	19.30	19.86	2 58.6
32	21 38 21.07	+ 5.370	-14 3 47.1	+51.92	9.639 8535	-2802.8	19.61	20.17	2 56.8

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.			Reduction to Orbit.		Heliocentric Latitude.			Var. per Day.		Logarithm of Radius Vector.		Var. per Day.	
		°	'	"	°	'	"	'	"	°	'	"	'	"				
Jan.	1	213	3	29.8	1	36	18.1	-3	0.5	+2	18	38.2	-4	10.7	9.858 9181		+821	
	3	216	16	0.5	1	36	12.6	2	57.9	2	10	4.2	4	23.1	9.859 0828		826	
	5	219	28	20.1	1	36	7.0	2	53.1	2	1	6.2	4	34.7	9.859 2482		828	
	7	222	40	28.7	1	36	1.6	2	46.1	1	51	45.9	4	45.4	9.859 4138		827	
	9	225	52	26.6	1	35	56.2	2	37.0	1	42	5.2	4	55.2	9.859 5790		824	
	11	229	4	13.7	1	35	50.9	-2	26.0	+1	32	5.8	-5	4.0	9.859 7434		+819	
	13	232	15	50.4	1	35	45.8	2	13.2	1	21	49.8	5	11.9	9.859 9063		810	
	15	235	27	16.9	1	35	40.7	1	58.7	1	11	18.9	5	18.8	9.860 0673		800	
	17	238	38	33.3	1	35	35.8	1	42.8	1	0	35.3	5	24.7	9.860 2260		787	
	19	241	49	40.2	1	35	31.1	1	25.6	0	49	40.9	5	29.6	9.860 3818		771	
	21	245	0	38.0	1	35	26.6	-1	7.4	+0	38	37.7	-5	33.4	9.860 5342		+753	
	23	248	11	26.9	1	35	22.4	0	48.4	0	27	27.9	5	36.2	9.860 6828		733	
Feb.	25	251	22	7.6	1	35	18.3	0	28.8	0	16	13.5	5	38.0	9.860 8271		710	
	27	254	32	40.4	1	35	14.5	-0	8.8	+0	4	56.5	5	38.8	9.860 9667		686	
	29	257	43	5.8	1	35	11.0	+0	11.3	-0	6	20.9	5	38.5	9.861 1012		659	
	31	260	53	24.5	1	35	7.8	+0	31.2	-0	17	36.8	-5	37.2	9.861 2302		+631	
	2	264	3	37.0	1	35	4.8	0	50.7	0	28	49.1	5	34.9	9.861 3583		600	
	4	267	13	43.7	1	35	2.1	1	9.6	0	39	55.7	5	31.5	9.861 4700		567	
	6	270	23	45.4	1	34	59.7	1	27.6	0	50	54.6	5	27.2	9.861 5801		533	
	8	273	33	42.5	1	34	57.5	1	44.6	1	1	43.8	5	21.9	9.861 6832		498	
	10	276	43	35.7	1	34	55.7	+2	0.2	-1	12	21.5	-5	15.6	9.861 7790		+460	
	12	279	53	25.6	1	34	54.2	2	14.4	1	22	45.7	5	8.4	9.861 8671		422	
	14	283	3	12.6	1	34	52.9	2	27.0	1	32	54.6	5	0.3	9.861 9476		382	
	16	286	12	57.4	1	34	52.0	2	37.7	1	42	46.2	4	51.2	9.862 0199		341	
Mar.	18	289	22	40.6	1	34	51.3	2	46.6	1	52	18.9	4	41.3	9.862 0840		299	
	20	292	32	22.6	1	34	50.8	+2	53.4	-2	1	30.9	-4	30.6	9.862 1396		+256	
	22	295	42	4.1	1	34	50.7	2	58.1	2	10	20.7	4	19.0	9.862 1865		213	
	24	298	51	45.5	1	34	50.8	3	0.6	2	18	46.5	4	6.7	9.862 2246		168	
	26	302	1	27.4	1	34	51.1	3	0.9	2	26	47.0	3	53.6	9.862 2538		124	
	28	305	11	10.1	1	34	51.7	2	59.0	2	34	20.6	3	39.9	9.862 2741		79	
	2	308	20	54.2	1	34	52.5	+2	55.0	-2	41	26.0	-3	25.5	9.862 2853		+ 33	
	4	311	30	40.1	1	34	53.4	2	48.8	2	48	2.0	3	10.4	9.862 2874		- 12	
	6	314	40	28.1	1	34	54.6	2	40.5	2	54	7.3	2	54.8	9.862 2805		57	
	8	317	50	18.7	1	34	56.0	2	30.3	2	59	40.8	2	38.7	9.862 2645		103	
	10	321	0	12.3	1	34	57.5	2	18.3	3	4	41.6	2	22.0	9.862 2395		147	
	12	324	10	9.0	1	34	59.2	+2	4.6	-3	9	8.6	-2	4.9	9.862 2056		-192	
Apr.	14	327	20	9.3	1	35	1.1	1	49.4	3	13	1.1	1	47.5	9.862 1628		236	
	16	330	30	13.4	1	35	3.1	1	32.8	3	16	18.3	1	29.7	9.862 1112		279	
	18	333	40	21.6	1	35	5.2	1	15.1	3	18	59.7	1	11.6	9.862 0511		321	
	20	336	50	34.1	1	35	7.4	0	56.4	3	21	4.6	0	53.3	9.861 9827		363	
	22	340	0	51.1	1	35	9.6	+0	37.1	-3	22	32.8	-0	34.8	9.861 9061		-403	
	24	343	11	12.7	1	35	12.0	+0	17.3	3	23	23.8	-0	16.2	9.861 8215		442	
	26	346	21	39.2	1	35	14.5	-0	2.7	3	23	37.5	+0	2.5	9.861 7292		481	
	28	349	32	10.8	1	35	17.1	0	22.7	3	23	13.8	0	21.2	9.861 6294		517	
	30	352	42	47.5	1	35	19.7	0	42.4	3	22	12.7	0	39.9	9.861 5226		551	
	1	355	53	29.5	1	35	22.4	-1	1.6	-3	20	34.3	+0	58.5	9.861 4090		-584	
	3	359	4	17.0	1	35	25.1	-1	20.1	-3	18	18.9	+1	16.9	9.861 2889		-616	

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
Apr.	1	355 53 29.5	1 35 22.4	-1 1.6	-3 20 34.3	+0 58.5	9.861 4090	-584
	3	359 4 17.0	1 35 25.1	1 20.1	3 18 18.9	1 16.9	9.861 2889	616
	5	2 15 9.9	1 35 27.9	1 37.6	3 15 26.9	1 35.1	9.861 1627	646
	7	5 26 8.5	1 35 30.7	1 53.8	3 11 58.6	1 53.1	9.861 0307	674
	9	8 37 12.7	1 35 33.5	2 8.7	3 7 54.6	2 10.8	9.860 8934	699
	11	11 48 22.7	1 35 36.5	-2 22.1	-3 3 15.8	+2 28.0	9.860 7513	-722
	13	14 59 38.6	1 35 39.4	2 33.7	2 58 2.9	2 44.9	9.860 6046	744
	15	18 11 0.5	1 35 42.5	2 43.3	2 52 16.7	3 1.2	9.860 4540	763
	17	21 22 28.5	1 35 45.5	2 51.0	2 45 58.3	3 17.1	9.860 2997	779
	19	24 34 2.5	1 35 48.6	2 56.5	2 39 8.7	3 32.4	9.860 1424	794
	21	27 45 42.8	1 35 51.7	-2 59.9	-2 31 49.2	+3 47.0	9.859 9824	-806
	23	30 57 29.4	1 35 54.9	3 1.0	2 24 1.0	4 1.0	9.859 8203	815
	25	34 9 22.4	1 35 58.1	2 59.9	2 15 45.7	4 14.2	9.859 6566	822
	27	37 21 21.8	1 36 1.3	2 56.5	2 7 4.6	4 26.7	9.859 4918	826
	29	40 33 27.8	1 36 4.7	2 51.0	1 57 59.4	4 38.4	9.859 3265	827
May	1	43 45 40.5	1 36 8.0	-2 43.3	-1 48 31.6	+4 49.3	9.859 1611	-826
	3	46 57 59.9	1 36 11.4	2 33.5	1 38 43.0	4 59.2	9.858 9961	823
	5	50 10 26.1	1 36 14.8	2 21.8	1 28 35.5	5 8.2	9.858 8320	817
	7	53 22 59.1	1 36 18.3	2 8.3	1 18 10.8	5 16.3	9.858 6694	808
	9	56 35 39.2	1 36 21.8	1 53.2	1 7 31.0	5 23.4	9.858 5089	797
	11	59 48 26.4	1 36 25.4	-1 36.7	-0 56 37.9	+5 29.5	9.858 3508	-783
	13	63 1 20.7	1 36 28.9	1 18.9	0 45 33.7	5 34.6	9.858 1957	767
	15	66 14 22.2	1 36 32.5	1 0.1	0 34 20.4	5 38.6	9.858 0441	748
	17	69 27 30.8	1 36 36.1	0 40.6	0 23 0.1	5 41.5	9.857 8965	727
	19	72 40 46.8	1 36 39.8	0 20.5	0 11 35.0	5 43.4	9.857 7534	704
	21	75 54 10.0	1 36 43.4	-0 0.2	-0 0 7.3	+5 44.1	9.857 6152	-678
	23	79 7 40.5	1 36 47.0	+0 20.2	+0 11 20.8	5 43.8	9.857 4824	650
	25	82 21 18.1	1 36 50.6	0 40.3	0 22 47.3	5 42.4	9.857 3553	620
	27	85 35 2.9	1 36 54.2	0 59.9	0 34 9.8	5 39.9	9.857 2344	588
	29	88 48 54.8	1 36 57.7	1 18.7	0 45 26.1	5 36.3	9.857 1202	554
	31	92 2 53.6	1 37 1.1	+1 36.6	+0 56 34.1	+5 31.5	9.857 0129	-519
June	2	95 16 59.1	1 37 4.4	1 53.3	1 7 31.5	5 25.7	9.856 9128	481
	4	98 31 11.3	1 37 7.7	2 8.5	1 18 16.4	5 18.9	9.856 8205	442
	6	101 45 29.8	1 37 10.8	2 22.0	1 28 46.6	5 11.0	9.856 7360	402
	8	104 59 54.5	1 37 13.8	2 33.8	1 39 0.0	5 2.1	9.856 6599	360
	10	108 14 25.0	1 37 16.7	+2 43.6	+1 48 54.5	+4 52.3	9.856 5922	-317
	12	111 29 1.0	1 37 19.3	2 51.3	1 58 28.4	4 41.4	9.856 5332	273
	14	114 43 42.1	1 37 21.8	2 56.8	2 7 39.6	4 29.6	9.856 4831	228
	16	117 58 28.0	1 37 24.0	3 0.1	2 16 26.4	4 17.0	9.856 4420	183
	18	121 13 18.1	1 37 26.0	3 1.0	2 24 47.0	4 3.5	9.856 4101	136
	20	124 28 12.0	1 37 27.8	+2 59.6	+2 32 39.8	+3 49.2	9.856 3875	- 90
	22	127 43 9.2	1 37 29.3	2 55.9	2 40 3.2	3 34.1	9.856 3743	- 42
	24	130 58 9.1	1 37 30.6	2 50.0	2 46 55.9	3 18.4	9.856 3706	+ 5
	26	134 13 11.2	1 37 31.5	2 41.9	2 53 16.3	3 2.0	9.856 3762	52
	28	137 28 14.7	1 37 32.1	2 31.6	2 59 3.4	2 45.0	9.856 3912	99
	30	140 43 19.2	1 37 32.3	+2 19.5	+3 4 15.9	+2 27.4	9.856 4156	+145
July	2	143 58 23.8	1 37 32.2	+2 5.5	+3 8 52.8	+2 9.4	9.856 4493	+192

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.			Reduction to Orblt.			Heliocentric Latitude.			Var. per Day.			Logarithm of Radius Vector.			Var. per Day.		
		°	'	"	°	'	"	'	"	°	'	"	'	"	'	"						
July	2	143	58	23.8	1	37	32.2	+2	5.5	+3	8	52.8	+2	9.4			9.856 4493		+192			
	4	147	13	28.0	1	37	31.9	1	49.9	3	12	53.3	1	51.0			9.856 4922		237			
	6	150	28	31.1	1	37	31.1	1	33.0	3	16	16.6	1	32.2			9.856 5440		281			
	8	153	43	32.3	1	37	30.0	1	14.8	3	19	2.0	1	13.1			9.856 6047		325			
	10	156	58	31.0	1	37	28.6	0	55.7	3	21	9.0	0	53.8			9.856 6740		368			
	12	160	13	26.5	1	37	26.8	+0	35.8	+3	22	37.3	+0	34.4			9.856 7517		+409			
	14	163	28	18.0	1	37	24.7	+0	15.6	3	23	26.6	+0	14.9			9.856 8376		450			
	16	166	43	4.9	1	37	22.2	-0	4.9	3	23	36.8	-0	4.7			9.856 9314		488			
	18	169	57	46.4	1	37	19.3	0	25.3	3	23	7.9	0	24.2			9.857 0327		525			
	20	173	12	22.0	1	37	16.2	0	45.4	3	22	0.0	0	43.6			9.857 1418		561			
	22	176	26	51.0	1	37	12.8	-1	4.9	+3	20	13.4	-1	2.9			9.857 2568		+594			
	24	179	41	12.8	1	37	9.0	1	23.5	3	17	48.6	1	21.9			9.857 3788		626			
	26	182	55	26.8	1	37	5.0	1	41.1	3	14	46.1	1	40.6			9.857 5069		655			
	28	186	9	32.5	1	37	0.7	1	57.4	3	11	6.5	1	59.0			9.857 6407		683			
	30	189	23	29.4	1	36	56.2	2	12.1	3	6	50.6	2	16.9			9.857 7798		708			
Aug.	1	192	37	17.0	1	36	51.4	-2	25.2	+3	1	59.4	-2	34.3			9.857 9237		+731			
	3	195	50	55.0	1	36	46.5	2	36.4	2	56	33.8	2	51.2			9.858 0719		751			
	5	199	4	22.9	1	36	41.4	2	45.7	2	50	34.9	3	7.6			9.858 2240		769			
	7	202	17	40.5	1	36	36.2	2	52.8	2	44	3.9	3	23.3			9.858 3795		785			
	9	205	30	47.6	1	36	30.9	2	57.8	2	37	2.2	3	38.3			9.858 5379		799			
	11	208	43	43.9	1	36	25.5	-3	0.5	+2	29	31.1	-3	52.7			9.858 6988		+809			
	13	211	56	29.4	1	36	20.0	3	0.9	2	21	32.1	4	6.2			9.858 8615		817			
	15	215	9	3.8	1	36	14.5	2	59.1	2	13	6.9	4	18.9			9.859 0255		823			
	17	218	21	27.3	1	36	9.0	2	55.0	2	4	17.1	4	30.8			9.859 1904		826			
	19	221	33	39.9	1	36	3.5	2	48.8	1	55	4.4	4	41.8			9.859 3556		826			
	21	224	45	41.5	1	35	58.1	-2	40.4	+1	45	30.7	-4	51.9			9.859 5207		+824			
	23	227	57	32.4	1	35	52.8	2	30.1	1	35	37.6	5	1.0			9.859 6850		819			
	25	231	9	12.7	1	35	47.6	2	17.9	1	25	27.2	5	9.2			9.859 8482		812			
	27	234	20	42.8	1	35	42.5	2	4.0	1	15	1.3	5	16.5			9.860 0097		802			
	29	237	32	2.8	1	35	37.5	1	48.5	1	4	21.9	5	22.7			9.860 1689		790			
31	240	43	13.1	1	35	32.8	-1	31.8	+0	53	31.1	-5	27.9			9.860 3255		+775				
Sept.	2	243	54	14.1	1	35	28.2	1	13.9	0	42	30.8	5	32.2			9.860 4789		758			
	4	247	5	6.2	1	35	23.9	0	55.1	0	31	23.1	5	35.4			9.860 6286		739			
	6	250	15	49.9	1	35	19.8	0	35.7	0	20	10.0	5	37.6			9.860 7742		717			
	8	253	26	25.5	1	35	15.9	-0	15.8	+0	8	53.6	5	38.6			9.860 9152		693			
	10	256	36	53.7	1	35	12.3	+0	4.3	-0	2	23.9	-5	38.7			9.861 0512		+667			
	12	259	47	15.0	1	35	9.0	0	24.3	0	13	40.6	5	37.8			9.861 1819		639			
	14	262	57	29.7	1	35	5.9	0	44.0	0	24	54.4	5	35.8			9.861 3068		610			
	16	266	7	38.7	1	35	3.1	1	3.1	0	36	3.2	5	32.8			9.861 4256		578			
	18	269	17	42.2	1	35	0.6	1	21.4	0	47	5.1	5	28.9			9.861 5378		544			
	20	272	27	41.1	1	34	58.4	+1	38.8	-0	57	58.0	-5	23.9			9.861 6432		+509			
	22	275	37	35.8	1	34	56.4	1	54.9	1	8	39.9	5	17.9			9.861 7414		473			
	24	278	47	27.0	1	34	54.8	2	9.6	1	19	9.1	5	11.0			9.861 8322		435			
	26	281	57	15.2	1	34	53.5	2	22.8	1	29	23.5	5	3.2			9.861 9152		395			
	28	285	7	1.1	1	34	52.4	2	34.2	1	39	21.4	4	54.5			9.861 9902		355			
	30	288	16	45.0	1	34	51.6	+2	43.7	-1	49	1.0	-4	44.9			9.862 0571		+313			
Oct.	2	291	26	27.6	1	34	51.1	+2	51.2	-1	58	20.4	-4	34.4			9.862 1155		+271			

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
Oct.	2	291 26 27.6	1 34 51.1	+2 51.2	-1 58 20.4	-4 34.4	9.862 1155	+271
	4	294 36 9.6	1 34 50.8	2 56.6	2 7 18.2	4 23.2	9.862 1654	228
	6	297 45 51.2	1 34 50.8	2 59.9	2 15 52.6	4 11.1	9.862 2066	184
	8	300 55 33.1	1 34 51.1	3 1.0	2 24 2.1	3 58.3	9.862 2389	139
	10	304 5 15.8	1 34 51.6	2 59.9	2 31 45.2	3 44.8	9.862 2622	94
	12	307 14 59.6	1 34 52.3	+2 56.6	-2 39 0.6	-3 30.6	9.862 2766	+ 49
	14	310 24 45.2	1 34 53.3	2 51.2	2 45 47.0	3 15.7	9.862 2819	+ 4
	16	313 34 32.8	1 34 54.3	2 43.6	2 52 3.2	3 0.3	9.862 2781	- 41
	18	316 44 22.7	1 34 55.6	2 34.1	2 57 48.0	2 44.4	9.862 2653	87
	20	319 54 15.5	1 34 57.1	2 22.7	3 3 0.3	2 27.9	9.862 2434	132
	22	323 4 11.3	1 34 58.8	+2 9.6	-3 7 39.2	-2 11.0	9.862 2126	-176
	24	326 14 10.6	1 35 0.6	1 54.8	3 11 43.9	1 53.6	9.862 1730	220
	26	329 24 13.6	1 35 2.5	1 38.7	3 15 13.5	1 35.9	9.862 1245	264
	28	332 34 20.6	1 35 4.5	1 21.4	3 18 7.5	1 18.0	9.862 0675	306
	30	335 44 31.8	1 35 6.7	1 3.0	3 20 25.2	0 59.7	9.862 0020	348
Nov.	1	338 54 47.4	1 35 8.9	+0 43.9	-3 22 6.3	-0 41.3	9.861 9283	-389
	3	342 5 7.6	1 35 11.3	0 24.3	3 23 10.3	0 22.7	9.861 8466	428
	5	345 15 32.6	1 35 13.8	+0 4.3	3 23 37.1	-0 4.0	9.861 7571	467
	7	348 26 2.7	1 35 16.3	-0 15.7	3 23 26.4	+0 14.7	9.861 6600	504
	9	351 36 37.8	1 35 18.9	0 35.6	3 22 38.4	0 33.4	9.861 5557	539
	11	354 47 18.2	1 35 21.5	-0 55.0	-3 21 13.0	+0 52.0	9.861 4444	-573
	13	357 58 4.0	1 35 24.2	1 13.7	3 19 10.5	1 10.5	9.861 3266	605
	15	1 8 55.2	1 35 27.0	1 31.6	3 16 31.2	1 28.8	9.861 2025	635
	17	4 19 51.9	1 35 29.8	1 48.3	3 13 15.5	1 46.9	9.861 0726	663
	19	7 30 54.3	1 35 32.7	2 3.7	3 9 23.9	2 4.6	9.860 9373	690
	21	10 42 2.6	1 35 35.6	-2 17.6	-3 4 57.2	+2 22.0	9.860 7968	-714
	23	13 53 16.6	1 35 38.5	2 29.8	2 59 56.1	2 39.0	9.860 6517	736
	25	17 4 36.6	1 35 41.5	2 40.2	2 54 21.4	2 55.6	9.860 5025	756
	27	20 16 2.6	1 35 44.5	2 48.6	2 48 14.1	3 11.7	9.860 3495	774
	29	23 27 34.7	1 35 47.6	2 54.9	2 41 35.2	3 27.1	9.860 1932	789
Dec.	1	26 39 13.0	1 35 50.7	-2 59.0	-2 34 26.0	+3 42.0	9.860 0342	-801
	3	29 50 57.6	1 35 53.9	3 0.9	2 26 47.7	3 56.2	9.859 8729	812
	5	33 2 48.5	1 35 57.1	3 0.6	2 18 41.7	4 9.7	9.859 7097	820
	7	36 14 45.9	1 36 0.3	2 58.0	2 10 9.4	4 22.5	9.859 5453	824
	9	39 26 49.8	1 36 3.6	2 53.2	2 1 12.4	4 34.4	9.859 3802	827
	11	42 39 0.3	1 36 6.9	-2 46.2	-1 51 52.2	+4 45.6	9.859 2148	-827
	13	45 51 17.5	1 36 10.3	2 37.1	1 42 10.7	4 55.8	9.859 0496	824
	15	49 3 41.6	1 36 13.7	2 26.1	1 32 9.5	5 5.2	9.858 8852	819
	17	52 16 12.4	1 36 17.2	2 13.2	1 21 50.6	5 13.6	9.858 7221	811
	19	55 28 50.3	1 36 20.7	1 58.7	1 11 15.9	5 21.0	9.858 5608	801
	21	58 41 35.2	1 36 24.2	-1 42.6	-1 0 27.2	+5 27.5	9.858 4019	-788
	23	61 54 27.3	1 36 27.8	1 25.3	0 49 26.6	5 32.9	9.858 2458	773
	25	65 7 26.4	1 36 31.4	1 6.8	0 38 16.2	5 37.3	9.858 0930	755
	27	68 20 32.8	1 36 35.0	0 47.5	0 26 58.1	5 40.6	9.857 9441	734
	29	71 33 46.5	1 36 38.7	0 27.6	0 15 34.4	5 42.9	9.857 7995	712
	31	74 47 7.4	1 36 42.3	-0 7.3	-0 4 7.4	+5 44.0	9.857 6596	-687
	33	78 0 35.5	1 36 45.9	+0 13.1	+0 7 20.9	+5 44.0	9.857 5250	-659

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MEAN TIME.



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
<b>Feb. 16</b>	22 9 41.12	+7.565	-12 28 49.3	+42.25	0.374 3462	+34.9	2.14	3.72	0 26.1
17	22 12 42.49	7.549	12 11 51.7	42.55	0.374 4292	34.3	2.14	3.72	0 25.1
18	22 15 43.46	7.533	11 54 47.1	42.84	0.374 5107	33.7	2.13	3.71	0 24.2
19	22 18 44.05	7.516	11 37 35.7	43.11	0.374 5908	33.0	2.13	3.71	0 23.3
20	22 21 44.24	7.500	11 20 17.8	43.38	0.374 6693	32.4	2.13	3.71	0 22.3
21	22 24 44.05	+7.484	-11 2 53.5	+43.64	0.374 7463	+31.7	2.13	3.71	0 21.4
22	22 27 43.48	7.468	10 45 23.1	43.89	0.374 8217	31.1	2.13	3.71	0 20.4
23	22 30 42.53	7.453	10 27 46.8	44.13	0.374 8956	30.5	2.13	3.71	0 19.5
24	22 33 41.21	7.437	10 10 4.7	44.37	0.374 9680	29.9	2.13	3.71	0 18.5
25	22 36 39.52	7.422	9 52 17.2	44.59	0.375 0389	29.2	2.13	3.71	0 17.6
26	22 39 37.46	+7.407	- 9 34 24.4	+44.80	0.375 1083	+28.6	2.13	3.71	0 16.6
27	22 42 35.04	7.392	9 16 26.6	45.00	0.375 1764	28.1	2.13	3.71	0 15.6
28	22 45 32.27	7.377	8 58 24.0	45.20	0.375 2431	27.5	2.13	3.71	0 14.6
<b>Mar. 1</b>	22 48 29.15	7.363	8 40 16.8	45.39	0.375 3086	27.0	2.13	3.71	0 13.6
2	22 51 25.69	7.349	8 22 5.1	45.58	0.375 3728	26.5	2.13	3.71	0 12.6
3	22 54 21.90	+7.335	- 8 3 49.2	+45.75	0.375 4359	+26.0	2.13	3.71	0 11.6
4	22 57 17.78	7.322	7 45 29.3	45.91	0.375 4978	25.6	2.13	3.71	0 10.6
5	23 0 13.35	7.309	7 27 5.6	46.06	0.375 5586	25.1	2.13	3.71	0 9.6
6	23 3 8.60	7.296	7 8 38.3	46.21	0.375 6182	24.6	2.12	3.70	0 8.6
7	23 6 3.55	7.284	6 50 7.6	46.35	0.375 6768	24.2	2.12	3.70	0 7.5
8	23 8 58.21	+7.272	- 6 31 33.7	+46.48	0.375 7343	+23.7	2.12	3.70	0 6.5
9	23 11 52.59	7.260	6 12 56.7	46.60	0.375 7906	23.2	2.12	3.70	0 5.5
10	23 14 46.69	7.249	5 54 16.9	46.71	0.375 8458	22.8	2.12	3.70	0 4.4
11	23 17 40.53	7.238	5 35 34.4	46.82	0.375 8999	22.3	2.12	3.70	0 3.4
12	23 20 34.11	7.227	5 16 49.5	46.92	0.375 9528	21.8	2.12	3.70	0 2.3
13	23 23 27.44	+7.217	- 4 58 2.3	+47.01	0.376 0046	+21.3	2.12	3.70	0 1.3
14	23 26 20.53	7.207	4 39 13.1	47.09	0.376 0550	20.7	2.12	3.70	0 0.3
15	23 29 13.39	7.198	4 20 22.0	47.17	0.376 1041	20.1	2.12	3.70	23 59.1
16	23 32 6.04	7.189	4 1 29.2	47.23	0.376 1517	19.5	2.12	3.70	23 57.0
17	23 34 58.47	7.180	3 42 35.0	47.29	0.376 1979	18.9	2.12	3.70	23 55.9
18	23 37 50.69	+7.172	- 3 23 39.5	+47.34	0.376 2426	+18.3	2.12	3.70	23 54.9
19	23 40 42.72	7.164	3 4 42.9	47.37	0.376 2857	17.6	2.12	3.70	23 53.8
20	23 43 34.56	7.156	2 45 45.4	47.40	0.376 3270	16.8	2.12	3.70	23 52.7
21	23 46 26.21	7.149	2 26 47.3	47.43	0.376 3665	16.1	2.12	3.70	23 51.6
22	23 49 17.69	7.141	2 7 48.7	47.44	0.376 4042	15.3	2.12	3.70	23 50.6
23	23 52 8.99	+7.134	- 1 48 49.9	+47.45	0.376 4399	+14.5	2.12	3.70	23 49.5
24	23 55 0.13	7.128	1 29 51.0	47.45	0.376 4736	13.6	2.12	3.70	23 48.3
25	23 57 51.11	7.121	1 10 52.4	47.44	0.376 5053	12.8	2.12	3.70	23 47.2
26	0 0 41.94	7.115	0 51 54.1	47.42	0.376 5351	12.0	2.12	3.70	23 46.1
27	0 3 32.62	7.109	0 32 56.3	47.39	0.376 5630	11.2	2.12	3.70	23 45.0
28	0 6 23.17	+7.104	- 0 13 59.3	+47.36	0.376 5890	+10.4	2.12	3.70	23 44.0
29	0 9 13.59	7.098	+ 0 4 56.8	47.31	0.376 6131	9.7	2.12	3.70	23 42.9
30	0 12 3.88	7.093	0 23 51.7	47.26	0.376 6354	8.9	2.12	3.70	23 41.8
31	0 14 54.06	7.089	0 42 45.3	47.20	0.376 6560	8.2	2.12	3.70	23 40.7
<b>Apr. 1</b>	0 17 44.14	7.085	1 1 37.5	47.14	0.376 6748	7.4	2.12	3.70	23 39.6
2	0 20 34.12	+7.081	+ 1 20 28.0	+47.07	0.376 6917	+ 6.7	2.12	3.70	23 38.4
3	0 23 24.01	+7.077	+ 1 39 16.6	+46.99	0.376 7068	+ 5.9	2.12	3.70	23 37.3



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Apr.	1	0	17 44.14	+7.085	+	1	1 37.5	+47.14	0.376 6748	+ 7.4	2.12	3.70	23 39.6
	2	0	20 34.12	7.081		1	20 28.0	47.07	0.376 6917	6.7	2.12	3.70	23 38.4
	3	0	23 24.01	7.077		1	39 16.6	46.99	0.376 7068	5.9	2.12	3.70	23 37.3
	4	0	26 13.82	7.074		1	58 3.3	46.90	0.376 7200	5.1	2.12	3.70	23 36.2
	5	0	29 3.56	7.071		2	16 47.8	46.80	0.376 7314	4.4	2.12	3.70	23 35.1
	6	0	31 53.24	+7.069	+	2	35 29.9	+46.70	0.376 7409	+ 3.6	2.12	3.70	23 34.0
	7	0	34 42.86	7.067		2	54 9.5	46.59	0.376 7486	2.8	2.12	3.70	23 32.9
	8	0	37 32.45	7.065		3	12 46.5	46.48	0.376 7545	2.1	2.12	3.70	23 31.8
	9	0	40 22.00	7.064		3	31 20.6	46.36	0.376 7585	1.2	2.12	3.70	23 30.6
	10	0	43 11.53	7.063		3	49 51.6	46.23	0.376 7604	+ 0.4	2.12	3.70	23 29.5
	11	0	46 1.04	+7.063	+	4	8 19.5	+46.09	0.376 7603	- 0.5	2.12	3.70	23 28.4
	12	0	48 50.54	7.063		4	26 44.1	45.95	0.376 7579	1.5	2.12	3.70	23 27.3
	13	0	51 40.05	7.063		4	45 5.1	45.80	0.376 7532	2.4	2.12	3.70	23 26.2
	14	0	54 29.56	7.063		5	3 22.4	45.64	0.376 7461	3.5	2.12	3.70	23 25.1
	15	0	57 19.09	7.064		5	21 35.9	45.48	0.376 7364	4.6	2.12	3.70	23 23.9
	16	1	0 8.64	+7.065	+	5	39 45.3	+45.31	0.376 7242	- 5.7	2.12	3.70	23 22.8
	17	1	2 58.23	7.067		5	57 50.5	45.13	0.376 7092	6.8	2.12	3.70	23 21.7
	18	1	5 47.85	7.068		6	15 51.3	44.94	0.376 6915	8.0	2.12	3.70	23 20.6
	19	1	8 37.51	7.070		6	33 47.6	44.75	0.376 6709	9.2	2.12	3.70	23 19.5
	20	1	11 27.22	7.072		6	51 39.1	44.55	0.376 6473	10.5	2.12	3.70	23 18.3
	21	1	14 16.98	+7.074	+	7	9 25.8	+44.34	0.376 6207	-11.7	2.12	3.70	23 17.2
	22	1	17 6.79	7.077		7	27 7.3	44.12	0.376 5911	13.0	2.12	3.70	23 16.1
	23	1	19 56.67	7.080		7	44 43.6	43.90	0.376 5584	14.3	2.12	3.70	23 15.0
	24	1	22 46.61	7.082		8	2 14.4	43.67	0.376 5226	15.6	2.12	3.70	23 13.9
	25	1	25 36.62	7.085		8	19 39.7	43.43	0.376 4836	16.9	2.12	3.70	23 12.8
	26	1	28 26.70	+7.088	+	8	36 59.1	+43.19	0.376 4415	-18.2	2.12	3.70	23 11.7
	27	1	31 16.86	7.092		8	54 12.7	42.94	0.376 3962	19.5	2.12	3.70	23 10.6
	28	1	34 7.11	7.095		9	11 20.2	42.68	0.376 3479	20.8	2.12	3.70	23 9.5
	29	1	36 57.44	7.099		9	28 21.5	42.42	0.376 2963	22.1	2.12	3.70	23 8.4
	30	1	39 47.87	7.104		9	45 16.4	42.15	0.376 2417	23.4	2.12	3.70	23 7.3
May	1	1	42 38.41	+7.108	+	10	2 4.8	+41.88	0.376 1838	-24.8	2.12	3.70	23 6.2
	2	1	45 29.05	7.112		10	18 46.6	41.60	0.376 1227	26.1	2.12	3.70	23 5.1
	3	1	48 19.80	7.117		10	35 21.5	41.31	0.376 0583	27.5	2.12	3.70	23 4.0
	4	1	51 10.67	7.122		10	51 49.6	41.02	0.375 9907	28.8	2.12	3.70	23 2.9
	5	1	54 1.67	7.128		11	8 10.5	40.72	0.375 9199	30.2	2.12	3.70	23 1.8
	6	1	56 52.79	+7.133	+	11	24 24.2	+40.42	0.375 8458	-31.6	2.12	3.70	23 0.8
	7	1	59 44.05	7.139		11	40 30.6	40.11	0.375 7684	33.0	2.12	3.70	22 59.7
	8	2	2 35.46	7.145		11	56 29.5	39.79	0.375 6875	34.4	2.12	3.70	22 58.6
	9	2	5 27.01	7.151		12	12 20.7	39.47	0.375 6031	35.9	2.12	3.70	22 57.5
	10	2	8 18.71	7.158		12	28 4.2	39.15	0.375 5151	37.4	2.13	3.71	22 56.4
	11	2	11 10.57	+7.164	+	12	43 39.9	+38.82	0.375 4235	-39.0	2.13	3.71	22 55.3
	12	2	14 2.60	7.171		12	59 7.5	38.48	0.375 3279	40.6	2.13	3.71	22 54.3
	13	2	16 54.79	7.178		13	14 26.9	38.14	0.375 2284	42.3	2.13	3.71	22 53.2
	14	2	19 47.15	7.186		13	29 38.0	37.79	0.375 1247	44.1	2.13	3.71	22 52.1
	15	2	22 39.69	7.193		13	44 40.7	37.43	0.375 0168	45.9	2.13	3.71	22 51.1
	16	2	25 32.39	+7.200	+	13	59 34.8	+37.07	0.374 9045	-47.7	2.13	3.71	22 50.0
	17	2	28 25.27	+7.207	+	14	14 20.2	+36.71	0.374 7877	-49.6	2.13	3.71	22 49.0

G

MEAN TIME.

Date.	Apparent Right Ascension.			Per r.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.						
	h	m	s		Noon.	Noon.	h m
May 17	2	28	25.27	.6	2.13	3.71	22 49.0
18	2	31	18.32	.5	2.13	3.71	22 47.9
19	2	34	11.54	.5	2.13	3.71	22 46.9
20	2	37	4.94	.4	2.14	3.72	22 45.8
21	2	39	58.51	.4	2.14	3.72	22 44.8
22	2	42	52.26	.4	2.14	3.72	22 43.7
23	2	45	46.18	.5	2.14	3.72	22 42.7
24	2	48	40.26	.5	2.14	3.72	22 41.6
25	2	51	34.52	.6	2.14	3.72	22 40.6
26	2	54	28.95	.7	2.14	3.72	22 39.6
27	2	57	23.55	.7	2.14	3.72	22 38.5
28	3	0	18.31	.8	2.14	3.73	22 37.5
29	3	3	13.25	.9	2.14	3.73	22 36.5
30	3	6	8.35	.0	2.14	3.73	22 35.5
31	3	9	3.62	.1	2.14	3.73	22 34.4
June 1	3	11	59.06	.2	2.14	3.73	22 33.4
2	3	14	54.67	.3	2.14	3.73	22 32.4
3	3	17	50.44	.5	2.15	3.74	22 31.4
4	3	20	46.38	.7	2.15	3.74	22 30.4
5	3	23	42.49	.0	2.15	3.74	22 29.4
6	3	26	38.77	.2	2.15	3.74	22 28.4
7	3	29	35.21	.5	2.15	3.74	22 27.4
8	3	32	31.82	.9	2.15	3.75	22 26.4
9	3	35	28.59	.3	2.15	3.75	22 25.4
10	3	38	25.53	.8	2.15	3.75	22 24.4
11	3	41	22.62	.3	2.15	3.75	22 23.4
12	3	44	19.87	.9	2.15	3.75	22 22.5
13	3	47	17.27	.5	2.16	3.76	22 21.5
14	3	50	14.81	.2	2.16	3.76	22 20.5
15	3	53	12.49	.0	2.16	3.76	22 19.5
16	3	56	10.29	.7	2.16	3.76	22 18.5
17	3	59	8.23	.5	2.16	3.77	22 17.5
18	4	2	6.28	.4	2.16	3.77	22 16.6
19	4	5	4.44	.3	2.16	3.77	22 15.6
20	4	8	2.71	.2	2.16	3.77	22 14.6
21	4	11	1.06	.1	2.17	3.78	22 13.6
22	4	13	59.50	.0	2.17	3.78	22 12.7
23	4	16	58.03	.0	2.17	3.78	22 11.7
24	4	19	56.62	.0	2.17	3.78	22 10.8
25	4	22	55.28	.0	2.18	3.79	22 9.8
26	4	25	54.00	.0	2.18	3.79	22 8.8
27	4	28	52.77	.0	2.18	3.79	22 7.9
28	4	31	51.58	.0	2.18	3.80	22 6.9
29	4	34	50.44	.0	2.18	3.80	22 5.9
30	4	37	49.32	.1	2.18	3.80	22 5.0
July 1	4	40	48.23	.1	2.19	3.81	22 4.0
2	4	43	47.15	.2	2.19	3.81	22 3.1











FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		°	'	"	'	"	°	'	"	"		
Apr.	1	359	40	19.4	37	28.0	-1	24	6.9	+47.4	0.143 9014	+1725
	3	0	55	11.8	37	24.3	1	22	31.1	48.4	0.144 2543	1804
	5	2	9	56.7	37	20.5	1	20	53.1	49.5	0.144 6228	1881
	7	3	24	33.8	37	16.5	1	19	12.9	50.6	0.145 0066	1957
	9	4	39	2.7	37	12.4	1	17	30.7	51.6	0.145 4054	2031
	11	5	53	23.2	37	8.1	-1	15	46.6	+52.6	0.145 8191	+2105
	13	7	7	34.9	37	3.6	1	14	0.4	53.6	0.146 2473	2177
	15	8	21	37.6	36	59.0	1	12	12.4	54.5	0.146 6897	2247
	17	9	35	31.0	36	54.3	1	10	22.6	55.3	0.147 1462	2317
	19	10	49	14.9	36	49.5	1	8	31.2	56.1	0.147 6164	2385
	21	12	2	49.0	36	44.5	-1	6	38.1	+57.0	0.148 1000	+2451
	23	13	16	13.0	36	39.5	1	4	43.4	57.7	0.148 5967	2516
May	25	14	29	26.8	36	34.3	1	2	47.2	58.5	0.149 1062	2579
	27	15	42	30.1	36	29.0	1	0	49.6	59.1	0.149 6283	2641
	29	16	55	22.7	36	23.6	0	58	50.7	59.8	0.150 1625	2701
	1	18	8	4.3	36	18.0	-0	56	50.5	+60.4	0.150 7086	+2760
	3	19	20	34.7	36	12.4	0	54	49.1	61.0	0.151 2663	2817
	5	20	32	53.8	36	6.7	0	52	46.5	61.6	0.151 8353	2872
	7	21	45	1.3	36	0.8	0	50	42.8	62.1	0.152 4151	2926
	9	22	56	57.0	35	54.9	0	48	38.1	62.6	0.153 0056	2979
	11	24	8	41.0	35	49.0	-0	46	32.5	+63.0	0.153 6064	+3029
	13	25	20	12.9	35	42.9	0	44	26.1	63.4	0.154 2170	3077
	15	26	31	32.5	35	36.7	0	42	18.8	63.8	0.154 8372	3124
	17	27	42	39.8	35	30.6	0	40	10.8	64.2	0.155 4667	3170
June	19	28	53	34.7	35	24.3	0	38	2.2	64.5	0.156 1051	3214
	21	30	4	16.8	35	17.9	-0	35	53.0	+64.7	0.156 7520	+3256
	23	31	14	46.3	35	11.5	0	33	43.3	65.0	0.157 4072	3296
	25	32	25	2.9	35	5.1	0	31	33.1	65.2	0.158 0703	3335
	27	33	35	6.5	34	58.5	0	29	22.5	65.4	0.158 7409	3372
	29	34	44	57.0	34	52.0	0	27	11.6	65.5	0.159 4188	3407
	31	35	54	34.4	34	45.4	-0	25	0.4	+65.6	0.160 1035	+3440
	2	37	3	58.4	34	38.7	0	22	49.1	65.7	0.160 7947	3472
	4	38	13	9.2	34	32.1	0	20	37.6	65.8	0.161 4922	3502
	6	39	22	6.6	34	25.3	0	18	26.1	65.8	0.162 1955	3531
	8	40	30	50.5	34	18.6	0	16	14.5	65.8	0.162 9044	3558
	10	41	39	21.0	34	11.8	-0	14	2.9	+65.8	0.163 6184	+3583
July	12	42	47	37.8	34	5.0	0	11	51.5	65.7	0.164 3373	3606
	14	43	55	41.0	33	58.2	0	9	40.2	65.6	0.165 0607	3628
	16	45	3	30.7	33	51.4	0	7	29.1	65.5	0.165 7883	3648
	18	46	11	6.6	33	44.5	0	5	18.3	65.3	0.166 5198	3667
	20	47	18	28.9	33	37.7	-0	3	7.8	+65.2	0.167 2549	+3684
	22	48	25	37.5	33	30.9	-0	0	57.7	64.9	0.167 9932	3699
	24	49	32	32.4	33	24.0	+0	1	11.9	64.7	0.168 7345	3713
	26	50	39	13.6	33	17.2	0	3	21.2	64.5	0.169 4783	3725
	28	51	45	41.1	33	10.3	0	5	29.9	64.2	0.170 2245	3736
	30	52	51	54.8	33	3.5	+0	7	38.0	+63.9	0.170 9728	+3746
	2	53	57	55.0	32	56.6	+0	9	45.6	+63.6	0.171 7227	+3753



FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		°	'	"	'	"	°	'	"	"		
July	2	53	57	55.0	32	56.6	+ 0	9	45.6	+63.6	0.171 7227	+3753
	4	55	3	41.4	32	49.8		0	11 52.4	63.2	0.172 4740	3760
	6	56	9	14.3	32	43.0		0	13 58.6	62.9	0.173 2265	3765
	8	57	14	33.5	32	36.2		0	16 4.0	62.5	0.173 9797	3768
	10	58	19	39.2	32	29.5		0	18 8.7	62.1	0.174 7336	3770
	12	59	24	31.4	32	22.7	+19.2	+0	20 12.5	+61.7	0.175 4877	+3771
	14	60	29	10.2	32	16.0		0	22 15.5	61.2	0.176 2418	3770
	16	61	33	35.5	32	9.3		0	24 17.5	60.8	0.176 9956	3768
	18	62	37	47.5	32	2.6		0	26 18.7	60.3	0.177 7488	3764
	20	63	41	46.1	31	56.0		0	28 18.9	59.9	0.178 5013	3760
	22	64	45	31.4	31	49.4	+28.2	+0	30 18.1	+59.3	0.179 2527	+3754
	24	65	49	3.7	31	42.8		0	32 16.2	58.8	0.180 0027	3746
	26	66	52	22.8	31	36.3		0	34 13.3	58.3	0.180 7511	3738
	28	67	55	29.0	31	29.8		0	36 9.3	57.7	0.181 4978	3728
	30	68	58	22.2	31	23.4		0	38 4.1	57.1	0.182 2423	3717
Aug.	1	70	1	2.6	31	17.0	+36.1	+0	39 57.8	+56.6	0.182 9846	+3705
	3	71	3	30.2	31	10.6		0	41 50.3	56.0	0.183 7244	3692
	5	72	5	45.1	31	4.3		0	43 41.6	55.4	0.184 4613	3677
	7	73	7	47.4	30	58.0		0	45 31.7	54.8	0.185 1953	3662
	9	74	9	37.3	30	51.8		0	47 20.6	54.1	0.185 9260	3645
	11	75	11	14.7	30	45.7	+42.7	+0	49 8.2	+53.5	0.186 6533	+3628
	13	76	12	40.0	30	39.6		0	50 54.5	52.8	0.187 3770	3609
	15	77	13	53.0	30	33.5		0	52 39.4	52.1	0.188 0968	3589
	17	78	14	53.9	30	27.5		0	54 23.0	51.5	0.188 8126	3568
	19	79	15	42.9	30	21.6		0	56 5.2	50.8	0.189 5241	3546
	21	80	16	20.1	30	15.6	+47.8	+0	57 46.0	+50.1	0.190 2312	+3524
	23	81	16	45.4	30	9.8		0	59 25.5	49.4	0.190 9337	3500
	25	82	16	59.3	30	4.0		1	1 3.5	48.7	0.191 6313	3476
	27	83	17	1.6	29	58.3		1	2 40.1	48.0	0.192 3240	3451
	29	84	16	52.5	29	52.6		1	4 15.3	47.2	0.193 0116	3425
Sept.	31	85	16	32.2	29	47.1	+51.4	+1	5 49.0	+46.5	0.193 6938	+3397
	2	86	16	0.8	29	41.5		1	7 21.2	45.7	0.194 3704	3369
	4	87	15	18.4	29	36.1		1	8 51.9	45.0	0.195 0414	3340
	6	88	14	25.1	29	30.7		1	10 21.1	44.2	0.195 7065	3311
	8	89	13	21.1	29	25.3		1	11 48.8	43.5	0.196 3657	3281
	10	90	12	6.4	29	20.0	+53.3	+1	13 15.0	+42.7	0.197 0187	+3249
	12	91	10	41.3	29	14.9		1	14 39.7	41.9	0.197 6654	3218
	14	92	9	5.9	29	9.7		1	16 2.7	41.2	0.198 3057	3185
	16	93	7	20.2	29	4.6		1	17 24.3	40.4	0.198 9394	3152
	18	94	5	24.5	28	59.6		1	18 44.3	39.6	0.199 5663	3118
	20	95	3	18.8	28	54.7	+53.7	+1	20 2.7	+38.8	0.200 1865	+3083
	22	96	1	3.3	28	49.8		1	21 19.6	38.0	0.200 7996	3048
	24	96	58	38.2	28	45.1		1	22 34.8	37.2	0.201 4057	3012
	26	97	56	3.6	28	40.3		1	23 48.5	36.4	0.202 0044	2976
	28	98	53	19.6	28	35.7		1	25 0.5	35.6	0.202 5959	2939
Oct.	30	99	50	26.3	28	31.1	+52.6	+1	26 10.9	+34.8	0.203 1799	+2901
	2	100	47	24.0	28	26.6	+52.2	+1	27 19.8	+34.0	0.203 7563	+2863

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
Oct.	2	100 47 24.0	28 26.6	+52.2	+1 27 19.8	+34.0	0.203 7563	+2863
	4	101 44 12.8	28 22.2	51.8	1 28 27.1	33.2	0.204 3251	2824
	6	102 40 52.7	28 17.8	51.3	1 29 32.7	32.4	0.204 8859	2785
	8	103 37 24.0	28 13.5	50.7	1 30 36.7	31.6	0.205 4389	2745
	10	104 33 46.8	28 9.3	50.1	1 31 39.0	30.8	0.205 9839	2705
	12	105 30 1.2	28 5.1	+49.4	+1 32 39.7	+29.9	0.206 5207	+2664
	14	106 26 7.4	28 1.1	48.7	1 33 38.7	29.1	0.207 0494	2623
	16	107 22 5.5	27 57.1	48.0	1 34 36.2	28.3	0.207 5697	2581
	18	108 17 55.7	27 53.1	47.2	1 35 32.0	27.5	0.208 0817	2539
	20	109 13 38.1	27 49.3	46.3	1 36 26.2	26.7	0.208 5851	2496
	22	110 9 12.9	27 45.5	+45.4	+1 37 18.8	+25.9	0.209 0801	+2453
	24	111 4 40.1	27 41.8	44.4	1 38 9.8	25.1	0.209 5663	2409
	26	112 0 0.1	27 38.2	43.4	1 38 59.1	24.2	0.210 0438	2365
	28	112 55 12.9	27 34.6	42.4	1 39 46.7	23.4	0.210 5125	2322
	30	113 50 18.7	27 31.2	41.3	1 40 32.7	22.6	0.210 9724	2277
Nov.	1	114 45 17.6	27 27.7	+40.2	+1 41 17.1	+21.8	0.211 4233	+2232
	3	115 40 9.7	27 24.4	39.0	1 41 59.9	21.0	0.211 8651	2187
	5	116 34 55.3	27 21.2	37.8	1 42 40.9	20.1	0.212 2979	2141
	7	117 29 34.4	27 18.0	36.6	1 43 20.4	19.3	0.212 7215	2095
	9	118 24 7.2	27 14.9	35.3	1 43 58.2	18.5	0.213 1359	2049
	11	119 18 33.9	27 11.9	+34.0	+1 44 34.4	+17.7	0.213 5410	+2002
	13	120 12 54.7	27 8.9	32.7	1 45 9.0	16.9	0.213 9368	1955
	15	121 7 9.5	27 6.0	31.3	1 45 41.9	16.0	0.214 3232	1908
	17	122 1 18.7	27 3.2	29.9	1 46 13.1	15.2	0.214 7001	1861
	19	122 55 22.4	27 0.5	28.5	1 46 42.7	14.4	0.215 0675	1813
	21	123 49 20.7	26 57.8	+27.0	+1 47 10.7	+13.6	0.215 4254	+1765
	23	124 43 13.7	26 55.2	25.6	1 47 37.1	12.8	0.215 7737	1717
	25	125 37 1.7	26 52.7	24.1	1 48 1.8	12.0	0.216 1123	1669
	27	126 30 44.6	26 50.2	22.6	1 48 25.0	11.2	0.216 4412	1620
	29	127 24 22.8	26 48.0	21.1	1 48 46.6	10.4	0.216 7602	1571
Dec.	1	128 17 56.5	26 45.7	+19.5	+1 49 6.4	+ 9.5	0.217 0696	+1522
	3	129 11 25.6	26 43.5	17.9	1 49 24.7	8.8	0.217 3691	1473
	5	130 4 50.4	26 41.3	16.3	1 49 41.4	8.0	0.217 6587	1423
	7	130 58 11.0	26 39.3	14.7	1 49 56.5	7.2	0.217 9384	1374
	9	131 51 27.6	26 37.3	13.1	1 50 10.0	6.4	0.218 2082	1324
	11	132 44 40.2	26 35.4	+11.5	+1 50 21.9	+ 5.6	0.218 4681	+1274
	13	133 37 49.1	26 33.6	9.9	1 50 32.2	4.8	0.218 7178	1224
	15	134 30 54.5	26 31.8	8.2	1 50 40.9	4.0	0.218 9576	1174
	17	135 23 56.4	26 30.1	6.6	1 50 48.0	3.2	0.219 1873	1123
	19	136 16 55.0	26 28.5	5.0	1 50 53.5	2.4	0.219 4069	1073
	21	137 9 50.5	26 27.0	+ 3.3	+1 50 57.5	+ 1.6	0.219 6164	+1022
	23	138 2 43.0	26 25.5	+ 1.6	1 50 59.9	+ 0.8	0.219 8157	971
	25	138 55 32.7	26 24.2	0.0	1 51 0.7	0.0	0.220 0048	920
	27	139 48 19.7	26 22.9	- 1.6	1 50 59.8	- 0.8	0.220 1838	869
	29	140 41 4.2	26 21.6	3.3	1 50 57.5	1.6	0.220 3525	818
	31	141 33 46.3	26 20.5	- 4.9	+1 50 53.5	- 2.4	0.220 5110	+ 767
	33	142 26 26.1	26 19.4	- 6.6	+1 50 48.1	- 3.1	0.220 6592	+ 715

JUPITER, 1917.  
GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.		Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.	
	Noon.			Noon.	Noon.			Noon.	Noon.		Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"				"	"	h	m
Jan. 1	1	36	58.03	+0.356	+	8	45 15.9	+2.89	0.665 0022		+607.4	20.36	1.90	6	53.6
2	1	37	6.97	0.388		8	46 27.5	3.07	0.666 4607		607.9	20.29	1.90	6	49.8
3	1	37	16.67	0.420		8	47 43.4	3.25	0.667 9203		608.3	20.22	1.89	6	46.1
4	1	37	27.12	0.451		8	49 3.5	3.43	0.669 3806		608.6	20.15	1.88	6	42.3
5	1	37	38.32	0.482		8	50 27.8	3.60	0.670 8412		608.6	20.08	1.88	6	38.6
6	1	37	50.26	+0.513	+	8	51 56.4	+3.78	0.672 3015		+608.4	20.02	1.87	6	34.8
7	1	38	2.94	0.544		8	53 29.1	3.96	0.673 7612		608.0	19.95	1.87	6	31.1
8	1	38	16.35	0.574		8	55 5.9	4.12	0.675 2199		607.5	19.88	1.86	6	27.4
9	1	38	30.49	0.604		8	56 46.7	4.28	0.676 6772		606.9	19.82	1.85	6	23.7
10	1	38	45.36	0.634		8	58 31.6	4.45	0.678 1327		606.1	19.75	1.85	6	20.0
11	1	39	0.94	+0.664	+	9	0 20.5	+4.62	0.679 5862		+605.1	19.68	1.84	6	16.4
12	1	39	17.24	0.694		9	2 13.3	4.78	0.681 0371		604.0	19.62	1.83	6	12.7
13	1	39	34.24	0.723		9	4 9.9	4.94	0.682 4852		602.7	19.55	1.83	6	9.1
14	1	39	51.94	0.752		9	6 10.5	5.10	0.683 9301		601.3	19.49	1.82	6	5.4
15	1	40	10.34	0.781		9	8 14.8	5.26	0.685 3713		599.7	19.42	1.82	6	1.8
16	1	40	29.43	+0.810	+	9	10 23.0	+5.42	0.686 8087		+598.0	19.36	1.81	5	58.2
17	1	40	49.21	0.838		9	12 34.7	5.57	0.688 2418		596.2	19.29	1.80	5	54.6
18	1	41	9.67	0.866		9	14 50.2	5.72	0.689 6703		594.2	19.23	1.80	5	51.0
19	1	41	30.80	0.894		9	17 9.3	5.87	0.691 0939		592.1	19.17	1.79	5	47.4
20	1	41	52.60	0.922		9	19 32.1	6.02	0.692 5122		589.8	19.11	1.79	5	43.9
21	1	42	15.06	+0.950	+	9	21 58.3	+6.17	0.693 9249		+587.4	19.04	1.78	5	40.3
22	1	42	38.18	0.977		9	24 28.1	6.32	0.695 3317		584.9	18.98	1.77	5	36.8
23	1	43	1.96	1.004		9	27 1.4	6.46	0.696 7322		582.2	18.92	1.77	5	33.2
24	1	43	26.38	1.031		9	29 38.0	6.59	0.698 1260		579.3	18.86	1.76	5	29.7
25	1	43	51.44	1.057		9	32 17.9	6.73	0.699 5129		576.4	18.80	1.76	5	26.2
26	1	44	17.13	+1.084	+	9	35 1.1	+6.87	0.700 8926		+573.3	18.74	1.75	5	22.7
27	1	44	43.45	1.109		9	37 47.5	7.00	0.702 2647		570.1	18.68	1.75	5	19.2
28	1	45	10.38	1.135		9	40 37.1	7.13	0.703 6290		566.8	18.62	1.74	5	15.7
29	1	45	37.91	1.160		9	43 29.7	7.26	0.704 9853		563.4	18.56	1.74	5	12.2
30	1	46	6.04	1.184		9	46 25.4	7.38	0.706 3333		559.9	18.51	1.73	5	8.8
31	1	46	34.77	+1.209	+	9	49 24.1	+7.51	0.707 6728		+556.3	18.45	1.72	5	5.3
Feb. 1	1	47	4.07	1.233		9	52 25.7	7.62	0.709 0035		552.6	18.39	1.72	5	1.9
2	1	47	33.95	1.257		9	55 30.1	7.74	0.710 3252		548.8	18.34	1.71	4	58.4
3	1	48	4.41	1.281		9	58 37.3	7.86	0.711 6377		544.9	18.28	1.71	4	55.0
4	1	48	35.42	1.304		10	1 47.3	7.97	0.712 9408		541.0	18.23	1.70	4	51.6
5	1	49	6.99	+1.327	+	10	4 59.9	+8.08	0.714 2343		+536.9	18.17	1.70	4	48.2
6	1	49	39.11	1.350		10	8 15.2	8.19	0.715 5181		532.9	18.12	1.69	4	44.8
7	1	50	11.77	1.372		10	11 33.1	8.30	0.716 7921		528.8	18.07	1.69	4	41.4
8	1	50	44.96	1.394		10	14 53.5	8.40	0.718 0561		524.5	18.01	1.68	4	38.0
9	1	51	18.67	1.416		10	18 16.4	8.50	0.719 3098		520.2	17.96	1.68	4	34.6
10	1	51	52.91	+1.437	+	10	21 41.7	+8.60	0.720 5531		+515.9	17.91	1.67	4	31.3
11	1	52	27.66	1.459		10	25 9.4	8.70	0.721 7859		511.4	17.86	1.67	4	27.9
12	1	53	2.92	1.480		10	28 39.4	8.80	0.723 0079		506.9	17.81	1.66	4	24.6
13	1	53	38.68	1.500		10	32 11.8	8.89	0.724 2192		502.4	17.76	1.66	4	21.2
14	1	54	14.94	1.521		10	35 46.3	8.98	0.725 4195		497.8	17.71	1.66	4	17.9
15	1	54	51.69	+1.541	+	10	39 23.0	+9.07	0.726 6087		+493.1	17.66	1.65	4	14.6
16	1	55	28.92	+1.561	+	10	43 1.9	+9.16	0.727 7866		+488.4	17.62	1.65	4	11.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit. Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Feb. 16	1 55 28.92	+1.561	+10 43 1.9	+ 9.16	0.727 7866	+488.4	17.62	1.65	4 11.3
17	1 56 6.62	1.581	10 46 42.8	9.25	0.728 9530	483.6	17.57	1.64	4 8.0
18	1 56 44.79	1.600	10 50 25.8	9.33	0.730 1079	478.8	17.52	1.64	4 4.7
19	1 57 23.44	1.620	10 54 10.8	9.41	0.731 2510	473.9	17.48	1.63	4 1.4
20	1 58 2.55	1.639	10 57 57.7	9.49	0.732 3821	468.8	17.43	1.63	3 58.1
21	1 58 42.10	+1.657	+11 1 46.4	+ 9.57	0.733 5011	+463.7	17.38	1.63	3 54.8
22	1 59 22.10	1.676	11 5 36.9	9.64	0.734 6078	458.5	17.34	1.62	3 51.6
23	2 0 2.54	1.694	11 9 29.2	9.71	0.735 7021	453.3	17.30	1.62	3 48.3
24	2 0 43.40	1.711	11 13 23.2	9.78	0.736 7839	448.1	17.25	1.61	3 45.1
25	2 1 24.69	1.729	11 17 18.8	9.85	0.737 8530	442.8	17.21	1.61	3 41.8
26	2 2 6.40	+1.746	+11 21 16.0	+ 9.91	0.738 9094	+437.5	17.17	1.60	3 38.6
27	2 2 48.52	1.763	11 25 14.7	9.98	0.739 9530	432.1	17.13	1.60	3 35.3
28	2 3 31.04	1.780	11 29 15.0	10.04	0.740 9836	426.7	17.09	1.60	3 32.1
Mar. 1	2 4 13.96	1.796	11 33 16.7	10.10	0.742 0013	421.3	17.05	1.59	3 28.9
2	2 4 57.26	1.812	11 37 19.7	10.15	0.743 0059	415.8	17.01	1.59	3 25.7
3	2 5 40.94	+1.828	+11 41 24.1	+10.21	0.743 9972	+410.3	16.97	1.59	3 22.5
4	2 6 25.00	1.843	11 45 29.7	10.26	0.744 9754	404.8	16.93	1.58	3 19.3
5	2 7 9.42	1.858	11 49 36.5	10.31	0.745 9403	399.3	16.89	1.58	3 16.1
6	2 7 54.20	1.873	11 53 44.5	10.36	0.746 8920	393.8	16.86	1.58	3 12.9
7	2 8 39.34	1.888	11 57 53.7	10.40	0.747 8305	388.2	16.82	1.57	3 9.7
8	2 9 24.84	+1.903	+12 2 3.9	+10.45	0.748 7556	+382.7	16.79	1.57	3 6.5
9	2 10 10.68	1.917	12 6 15.2	10.49	0.749 6673	377.1	16.75	1.57	3 3.4
10	2 10 56.85	1.931	12 10 27.4	10.53	0.750 5655	371.4	16.72	1.56	3 0.2
11	2 11 43.36	1.944	12 14 40.6	10.57	0.751 4501	365.8	16.68	1.56	2 57.0
12	2 12 30.19	1.958	12 18 54.7	10.61	0.752 3211	360.1	16.65	1.56	2 53.9
13	2 13 17.35	+1.972	+12 23 9.7	+10.64	0.753 1784	+354.4	16.62	1.55	2 50.7
14	2 14 4.83	1.985	12 27 25.4	10.67	0.754 0220	348.7	16.58	1.55	2 47.6
15	2 14 52.62	1.998	12 31 42.0	10.71	0.754 8519	342.9	16.55	1.55	2 44.4
16	2 15 40.72	2.010	12 35 59.3	10.74	0.755 6680	337.2	16.52	1.54	2 41.3
17	2 16 29.12	2.023	12 40 17.3	10.76	0.756 4703	331.4	16.49	1.54	2 38.2
18	2 17 17.82	+2.035	+12 44 36.0	+10.79	0.757 2586	+325.6	16.46	1.54	2 35.1
19	2 18 6.82	2.047	12 48 55.3	10.82	0.758 0330	319.8	16.43	1.54	2 32.0
20	2 18 56.10	2.059	12 53 15.1	10.84	0.758 7934	313.9	16.40	1.53	2 28.8
21	2 19 45.67	2.071	12 57 35.4	10.86	0.759 5396	308.0	16.37	1.53	2 25.7
22	2 20 35.51	2.082	13 1 56.2	10.88	0.760 2717	302.1	16.35	1.53	2 22.6
23	2 21 25.62	+2.093	+13 6 17.5	+10.89	0.760 9895	+296.1	16.32	1.53	2 19.5
24	2 22 16.00	2.104	13 10 39.1	10.91	0.761 6929	290.1	16.29	1.52	2 16.4
25	2 23 6.64	2.115	13 15 1.1	10.92	0.762 3821	284.1	16.27	1.52	2 13.3
26	2 23 57.52	2.125	13 19 23.3	10.93	0.763 0568	278.1	16.24	1.52	2 10.2
27	2 24 48.65	2.135	13 23 45.8	10.94	0.763 7171	272.1	16.22	1.52	2 7.2
28	2 25 40.02	+2.145	+13 28 8.4	+10.95	0.764 3631	+266.1	16.19	1.51	2 4.1
29	2 26 31.63	2.155	13 32 31.2	10.95	0.764 9946	260.1	16.17	1.51	2 1.0
30	2 27 23.45	2.164	13 36 54.2	10.96	0.765 6117	254.1	16.15	1.51	1 57.9
31	2 28 15.50	2.173	13 41 17.2	10.96	0.766 2144	248.1	16.12	1.51	1 54.9
Apr. 1	2 29 7.77	2.182	13 45 40.3	10.96	0.766 8028	242.2	16.10	1.51	1 51.8
2	2 30 0.25	+2.191	+13 50 3.4	+10.96	0.767 3768	+236.2	16.08	1.50	1 48.7
3	2 30 52.94	+2.200	+13 54 26.5	+10.96	0.767 9363	+230.1	16.06	1.50	1 45.7

## MEAN TIME.

Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
Noon.	Noon.	Noon.	Noon.	h m
0.766 107	+242.2	16.10	1.51	1 51.8
0.767 3768	226.2	16.08	1.50	1 48.7
0.767 9363	220.1	16.06	1.50	1 45.7
0.768 4814	224.1	16.04	1.50	1 42.6
0.769 0121	218.1	16.02	1.50	1 39.6
0.769 5284	+212.1	16.00	1.50	1 36.5
0.770 0303	206.1	15.98	1.49	1 33.5
0.770 5179	200.2	15.96	1.49	1 30.4
0.770 9911	194.2	15.95	1.49	1 27.4
0.771 4500	188.2	15.93	1.49	1 24.4
0.771 8944	+182.2	15.91	1.49	1 21.3
0.772 3244	176.2	15.90	1.49	1 18.3
0.772 7400	170.1	15.88	1.48	1 15.3
0.773 1411	164.1	15.87	1.48	1 12.3
0.773 5277	158.1	15.85	1.48	1 9.2
0.773 8999	+152.1	15.84	1.48	1 6.2
0.774 2576	146.0	15.83	1.48	1 3.2
0.774 6007	139.9	15.82	1.48	1 0.2
0.774 9292	133.8	15.80	1.48	0 57.2
0.775 2431	127.8	15.79	1.48	0 54.2
0.775 5424	+121.7	15.78	1.48	0 51.1
0.775 8270	115.5	15.77	1.47	0 48.1
0.776 0970	109.5	15.76	1.47	0 45.1
0.776 3524	103.4	15.75	1.47	0 42.1
0.776 5932	97.3	15.74	1.47	0 39.1
0.776 8195	+ 91.2	15.73	1.47	0 36.1
0.777 0311	85.1	15.73	1.47	0 33.1
0.777 2282	79.1	15.72	1.47	0 30.1
0.777 4108	73.1	15.71	1.47	0 27.1
0.777 5789	67.0	15.71	1.47	0 24.1
0.777 7325	+ 61.0	15.70	1.47	0 21.2
0.777 8716	55.0	15.70	1.47	0 18.2
0.777 9963	49.0	15.69	1.47	0 15.2
0.778 1067	42.9	15.69	1.47	0 12.2
0.778 2027	37.0	15.68	1.47	0 9.2
0.778 2845	+ 31.1	15.68	1.47	0 6.2
0.778 3519	25.1	15.68	1.47	0 3.2
0.778 4051	19.2	15.68	1.47	0 0.2
0.778 4439	13.2	15.68	1.47	23 54.2
0.778 4684	7.3	15.68	1.47	23 51.3
0.778 4787	+ 1.3	15.67	1.47	23 48.3
0.778 4746	- 4.7	15.67	1.47	23 45.3
0.778 4582	10.6	15.68	1.47	23 42.3
0.778 4235	16.6	15.68	1.47	23 39.3
0.778 3764	22.6	15.68	1.47	23 36.3
0.778 3150	- 28.6	15.68	1.47	23 33.3
0.778 2392	- 34.6	15.68	1.47	23 30.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit. Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
May 17	3 11 45.23	+2.382	+16 58 39.8	+9.59	0.778 2392	- 34.6	15.68	1.47	23 30.3
18	3 12 42.40	2.382	17 2 29.4	9.54	0.778 1491	40.5	15.69	1.47	23 27.4
19	3 13 39.57	2.382	17 6 17.6	9.48	0.778 0446	46.5	15.69	1.47	23 24.4
20	3 14 36.72	2.381	17 10 4.5	9.42	0.777 9257	52.5	15.69	1.47	23 21.4
21	3 15 33.86	2.380	17 13 50.0	9.37	0.777 7925	58.5	15.70	1.47	23 18.4
22	3 16 30.98	+2.379	+17 17 34.1	+9.31	0.777 6449	- 64.5	15.70	1.47	23 15.5
23	3 17 28.07	2.378	17 21 16.8	9.25	0.777 4829	70.5	15.71	1.47	23 12.5
24	3 18 25.12	2.376	17 24 58.1	9.19	0.777 3067	76.4	15.72	1.47	23 9.5
25	3 19 22.13	2.375	17 28 37.9	9.13	0.777 1162	82.3	15.72	1.47	23 6.5
26	3 20 19.10	2.373	17 32 16.3	9.07	0.776 9116	88.2	15.73	1.47	23 3.5
27	3 21 16.01	+2.370	+17 35 53.1	+9.00	0.776 6927	- 94.1	15.74	1.47	23 0.5
28	3 22 12.88	2.368	17 39 28.5	8.94	0.776 4598	100.0	15.75	1.47	22 57.5
29	3 23 9.68	2.365	17 43 2.3	8.88	0.776 2128	105.9	15.76	1.47	22 54.5
30	3 24 6.42	2.363	17 46 34.6	8.81	0.775 9517	111.7	15.77	1.47	22 51.5
31	3 25 3.09	2.360	17 50 5.3	8.75	0.775 6766	117.6	15.78	1.47	22 48.5
June 1	3 25 59.69	+2.357	+17 53 34.5	+8.68	0.775 3875	-123.4	15.79	1.48	22 45.5
2	3 26 56.21	2.353	17 57 2.1	8.62	0.775 0844	129.2	15.80	1.48	22 42.5
3	3 27 52.64	2.350	18 0 28.1	8.55	0.774 7675	134.9	15.81	1.48	22 39.5
4	3 28 48.99	2.346	18 3 52.6	8.48	0.774 4366	140.7	15.82	1.48	22 36.5
5	3 29 45.24	2.342	18 7 15.3	8.42	0.774 0920	146.5	15.83	1.48	22 33.5
6	3 30 41.40	+2.338	+18 10 36.5	+8.35	0.773 7334	-152.3	15.85	1.48	22 30.6
7	3 31 37.46	2.334	18 13 56.1	8.28	0.773 3610	158.1	15.86	1.48	22 27.6
8	3 32 33.42	2.329	18 17 14.0	8.21	0.772 9748	163.8	15.87	1.48	22 24.6
9	3 33 29.27	2.325	18 20 30.2	8.14	0.772 5748	169.5	15.89	1.49	22 21.5
10	3 34 25.01	2.320	18 23 44.8	8.07	0.772 1610	175.3	15.90	1.49	22 18.5
11	3 35 20.63	+2.315	+18 26 57.7	+8.00	0.771 7335	-181.0	15.92	1.49	22 15.5
12	3 36 16.13	2.310	18 30 9.0	7.93	0.771 2921	186.8	15.94	1.49	22 12.5
13	3 37 11.49	2.304	18 33 18.5	7.86	0.770 8369	192.6	15.95	1.49	22 9.5
14	3 38 6.72	2.298	18 36 26.3	7.79	0.770 3678	198.4	15.97	1.49	22 6.5
15	3 39 1.81	2.293	18 39 32.4	7.72	0.769 8848	204.1	15.99	1.49	22 3.5
16	3 39 56.76	+2.286	+18 42 36.7	+7.64	0.769 3880	-209.9	16.01	1.50	22 0.4
17	3 40 51.54	2.279	18 45 39.3	7.57	0.768 8775	215.6	16.03	1.50	21 57.4
18	3 41 46.17	2.273	18 48 40.0	7.50	0.768 3531	221.3	16.04	1.50	21 54.4
19	3 42 40.63	2.266	18 51 39.1	7.42	0.767 8151	227.0	16.06	1.50	21 51.3
20	3 43 34.92	2.258	18 54 36.3	7.35	0.767 2634	232.7	16.08	1.50	21 48.3
21	3 44 29.02	+2.250	+18 57 31.8	+7.27	0.766 6981	-238.4	16.10	1.51	21 45.3
22	3 45 22.94	2.243	19 0 25.4	7.20	0.766 1193	244.0	16.13	1.51	21 42.2
23	3 46 16.67	2.235	19 3 17.2	7.12	0.765 5270	249.6	16.15	1.51	21 39.2
24	3 47 10.21	2.227	19 6 7.2	7.05	0.764 9211	255.2	16.17	1.51	21 36.1
25	3 48 3.54	2.218	19 8 55.4	6.97	0.764 3019	260.7	16.19	1.51	21 33.0
26	3 48 56.66	+2.209	+19 11 41.8	+6.89	0.763 6692	-266.4	16.22	1.52	21 30.0
27	3 49 49.56	2.200	19 14 26.3	6.82	0.763 0232	271.9	16.24	1.52	21 27.0
28	3 50 42.25	2.190	19 17 9.1	6.74	0.762 3640	277.4	16.27	1.52	21 23.9
29	3 51 34.70	2.181	19 19 49.9	6.66	0.761 6917	282.9	16.29	1.52	21 20.8
30	3 52 26.93	2.171	19 22 29.0	6.59	0.761 0062	288.3	16.32	1.53	21 17.8
July 1	3 53 18.92	+2.161	+19 25 6.2	+6.51	0.760 3077	-293.8	16.34	1.53	21 14.7
2	3 54 10.67	+2.151	+19 27 41.5	+6.43	0.759 5962	-299.2	16.37	1.53	21 11.6





## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Aug. 16	4 27 1.01	+1.395	+20 51 57.1	+2.96	0.715 0815	-511.6	18.14	1.70	18 47.1
17	4 27 34.19	1.370	20 53 7.1	2.88	0.713 8494	515.1	18.19	1.70	18 43.7
18	4 28 6.79	1.346	20 54 15.4	2.81	0.712 6089	518.6	18.24	1.71	18 40.3
19	4 28 38.79	1.321	20 55 22.0	2.74	0.711 3603	521.9	18.29	1.71	18 36.9
20	4 29 10.19	1.295	20 56 26.7	2.66	0.710 1037	525.2	18.35	1.72	18 33.5
21	4 29 40.97	+1.270	+20 57 29.7	+2.59	0.708 8394	-528.4	18.40	1.72	18 30.1
22	4 30 11.14	1.244	20 58 31.0	2.52	0.707 5676	531.4	18.45	1.73	18 26.6
23	4 30 40.68	1.218	20 59 30.5	2.44	0.706 2886	534.4	18.51	1.73	18 23.2
24	4 31 9.58	1.191	21 0 28.3	2.37	0.705 0026	537.2	18.56	1.74	18 19.7
25	4 31 37.84	1.164	21 1 24.4	2.30	0.703 7098	540.0	18.62	1.74	18 16.2
26	4 32 5.46	+1.137	+21 2 18.8	+2.23	0.702 4106	-542.6	18.68	1.75	18 12.8
27	4 32 32.42	1.110	21 3 11.4	2.16	0.701 1051	545.2	18.73	1.75	18 9.3
28	4 32 58.72	1.082	21 4 2.4	2.09	0.699 7937	547.6	18.79	1.76	18 5.8
29	4 33 24.34	1.054	21 4 51.6	2.02	0.698 4765	550.0	18.85	1.76	18 2.3
30	4 33 49.29	1.025	21 5 39.2	1.95	0.697 1538	552.2	18.90	1.77	17 58.7
31	4 34 13.56	+0.997	+21 6 25.0	+1.88	0.695 8258	-554.4	18.96	1.77	17 55.2
Sept. 1	4 34 37.14	0.968	21 7 9.2	1.81	0.694 4928	556.4	19.02	1.78	17 51.6
2	4 35 0.01	0.939	21 7 51.7	1.74	0.693 1551	558.3	19.08	1.78	17 48.1
3	4 35 22.19	0.909	21 8 32.6	1.67	0.691 8129	560.2	19.14	1.79	17 44.5
4	4 35 43.65	0.879	21 9 11.8	1.60	0.690 4664	561.9	19.20	1.79	17 40.9
5	4 36 4.39	+0.849	+21 9 49.3	+1.53	0.689 1159	-563.5	19.26	1.80	17 37.3
6	4 36 24.40	0.818	21 10 25.1	1.46	0.687 7618	564.9	19.32	1.81	17 33.7
7	4 36 43.67	0.788	21 10 59.3	1.39	0.686 4043	566.3	19.38	1.81	17 30.1
8	4 37 2.20	0.756	21 11 31.9	1.32	0.685 0437	567.5	19.44	1.82	17 26.5
9	4 37 19.97	0.725	21 12 2.8	1.25	0.683 6803	568.6	19.50	1.82	17 22.8
10	4 37 36.98	+0.693	+21 12 32.1	+1.19	0.682 3146	-569.5	19.56	1.83	17 19.2
11	4 37 53.22	0.660	21 12 59.8	1.12	0.680 9470	570.2	19.62	1.83	17 15.5
12	4 38 8.68	0.628	21 13 25.8	1.05	0.679 5777	570.8	19.68	1.84	17 11.8
13	4 38 23.36	0.595	21 13 50.2	0.98	0.678 2072	571.2	19.75	1.85	17 8.1
14	4 38 37.24	0.562	21 14 13.0	0.92	0.676 8359	571.5	19.81	1.85	17 4.4
15	4 38 50.33	+0.529	+21 14 34.2	+0.85	0.675 4642	-571.6	19.87	1.86	17 0.7
16	4 39 2.61	0.495	21 14 53.7	0.78	0.674 0925	571.5	19.93	1.86	16 57.0
17	4 39 14.08	0.461	21 15 11.7	0.71	0.672 7212	571.2	20.00	1.87	16 53.2
18	4 39 24.74	0.427	21 15 28.0	0.65	0.671 3509	570.7	20.06	1.88	16 49.4
19	4 39 34.58	0.393	21 15 42.8	0.58	0.669 9820	570.0	20.12	1.88	16 45.7
20	4 39 43.59	+0.358	+21 15 55.9	+0.51	0.668 6148	-569.2	20.19	1.89	16 41.9
21	4 39 51.78	0.324	21 16 7.5	0.45	0.667 2499	568.2	20.25	1.89	16 38.1
22	4 39 59.14	0.289	21 16 17.4	0.38	0.665 8877	567.0	20.31	1.90	16 34.2
23	4 40 5.67	0.254	21 16 25.8	0.32	0.664 5287	565.5	20.38	1.90	16 30.4
24	4 40 11.35	0.219	21 16 32.6	0.25	0.663 1733	563.9	20.44	1.91	16 26.6
25	4 40 16.20	+0.184	+21 16 37.9	+0.19	0.661 8220	-562.1	20.50	1.92	16 22.7
26	4 40 20.20	0.149	21 16 41.5	0.12	0.660 4753	560.1	20.57	1.92	16 18.8
27	4 40 23.36	0.114	21 16 43.6	+0.05	0.659 1337	557.9	20.63	1.93	16 14.9
28	4 40 25.67	0.078	21 16 44.1	-0.01	0.657 7976	555.5	20.70	1.94	16 11.0
29	4 40 27.13	0.043	21 16 43.1	0.08	0.656 4675	552.9	20.76	1.94	16 7.1
30	4 40 27.74	+0.008	+21 16 40.4	-0.14	0.655 1439	-550.1	20.82	1.95	16 3.2
Oct. 1	4 40 27.50	-0.028	+21 16 36.2	-0.21	0.653 8271	-547.2	20.89	1.95	15 59.2



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.		
	Noon.				Noon.									Noon.	
	h	m	s	s	°	'	"	"			"	"	h	m	
Oct.	1	4	40	27.50	-0.028	+21	16	36.2	-0.21	0.653 8271	-547.2	20.89	1.95	15	59.2
	2	4	40	26.41	0.063	21	16	30.5	0.27	0.652 5178	543.9	20.95	1.96	15	55.3
	3	4	40	24.46	0.099	21	16	23.2	0.34	0.651 2163	540.6	21.01	1.96	15	51.3
	4	4	40	21.66	0.135	21	16	14.3	0.40	0.649 9232	537.0	21.07	1.97	15	47.3
	5	4	40	18.00	0.170	21	16	3.9	0.47	0.648 6390	533.1	21.14	1.98	15	43.3
	6	4	40	13.48	-0.206	+21	15	51.8	-0.53	0.647 3644	-529.0	21.20	1.98	15	39.3
	7	4	40	8.11	0.242	21	15	38.2	0.60	0.646 0998	524.7	21.26	1.99	15	35.3
	8	4	40	1.87	0.278	21	15	23.1	0.66	0.644 8459	520.2	21.32	1.99	15	31.2
	9	4	39	54.77	0.314	21	15	6.4	0.73	0.643 6032	515.4	21.38	2.00	15	27.2
	10	4	39	46.82	0.349	21	14	48.1	0.79	0.642 3724	510.3	21.44	2.00	15	23.1
	11	4	39	38.01	-0.385	+21	14	28.3	-0.86	0.641 1540	-505.1	21.50	2.01	15	19.0
	12	4	39	28.35	0.420	21	14	6.9	0.92	0.639 9487	499.4	21.56	2.02	15	14.9
	13	4	39	17.85	0.455	21	13	44.0	0.99	0.638 7570	493.6	21.62	2.02	15	10.8
	14	4	39	6.50	0.490	21	13	19.5	1.05	0.637 5796	487.5	21.68	2.03	15	6.6
	15	4	38	54.32	0.525	21	12	53.5	1.12	0.636 4172	481.1	21.74	2.03	15	2.5
	16	4	38	41.31	-0.559	+21	12	25.9	-1.18	0.635 2703	-474.5	21.80	2.04	14	58.4
	17	4	38	27.47	0.594	21	11	56.8	1.24	0.634 1396	467.7	21.85	2.04	14	54.2
	18	4	38	12.82	0.628	21	11	26.3	1.31	0.633 0256	460.6	21.91	2.05	14	50.0
	19	4	37	57.35	0.661	21	10	54.1	1.37	0.631 9291	453.2	21.96	2.05	14	45.8
	20	4	37	41.09	0.694	21	10	20.5	1.43	0.630 8506	445.5	22.02	2.06	14	41.6
	21	4	37	24.04	-0.726	+21	9	45.3	-1.50	0.629 7907	-437.7	22.07	2.06	14	37.4
	22	4	37	6.22	0.759	21	9	8.7	1.56	0.628 7501	429.5	22.13	2.07	14	33.2
	23	4	36	47.62	0.791	21	8	30.5	1.62	0.627 7292	421.2	22.18	2.07	14	28.9
	24	4	36	28.27	0.822	21	7	50.9	1.68	0.626 7287	412.6	22.23	2.08	14	24.6
	25	4	36	8.18	0.852	21	7	9.9	1.74	0.625 7491	403.7	22.28	2.08	14	20.4
	26	4	35	47.36	-0.882	+21	6	27.4	-1.80	0.624 7910	-394.7	22.33	2.09	14	16.1
	27	4	35	25.82	0.912	21	5	43.5	1.86	0.623 8548	385.4	22.38	2.09	14	11.8
	28	4	35	3.58	0.941	21	4	58.1	1.92	0.622 9413	375.9	22.43	2.10	14	7.5
	29	4	34	40.65	0.970	21	4	11.2	1.98	0.622 0508	366.2	22.47	2.10	14	3.2
	30	4	34	17.04	0.998	21	3	23.0	2.04	0.621 1839	356.2	22.52	2.11	13	58.9
	31	4	33	52.76	-1.025	+21	2	33.4	-2.10	0.620 3411	-346.1	22.56	2.11	13	54.5
Nov.	1	4	33	27.84	1.052	21	1	42.4	2.15	0.619 5230	335.8	22.60	2.11	13	50.2
	2	4	33	2.28	1.078	21	0	50.1	2.21	0.618 7301	325.0	22.64	2.12	13	45.8
	3	4	32	36.10	1.104	20	59	56.5	2.26	0.617 9630	314.2	22.68	2.12	13	41.4
	4	4	32	9.32	1.128	20	59	1.6	2.31	0.617 2221	303.2	22.72	2.12	13	37.0
	5	4	31	41.96	-1.152	+20	58	5.4	-2.37	0.616 5080	-291.9	22.76	2.13	13	32.6
	6	4	31	14.03	1.175	20	57	7.9	2.42	0.615 8212	280.4	22.80	2.13	13	28.2
	7	4	30	45.55	1.198	20	56	9.1	2.47	0.615 1622	268.7	22.83	2.13	13	23.8
	8	4	30	16.54	1.219	20	55	9.1	2.52	0.614 5315	256.8	22.86	2.14	13	19.4
	9	4	29	47.03	1.240	20	54	7.9	2.57	0.613 9296	244.7	22.90	2.14	13	15.0
	10	4	29	17.03	-1.260	+20	53	5.5	-2.62	0.613 3570	-232.4	22.93	2.14	13	10.5
	11	4	28	46.56	1.279	20	52	1.9	2.67	0.612 8141	219.9	22.95	2.15	13	6.1
	12	4	28	15.65	1.297	20	50	57.3	2.71	0.612 3014	207.3	22.98	2.15	13	1.6
	13	4	27	44.33	1.313	20	49	51.7	2.75	0.611 8192	194.5	23.01	2.15	12	57.2
	14	4	27	12.61	1.329	20	48	45.1	2.79	0.611 3680	181.5	23.03	2.15	12	52.8
	15	4	26	40.52	-1.344	+20	47	37.6	-2.83	0.610 9481	-168.4	23.05	2.16	12	48.3
	16	4	26	8.08	-1.358	+20	46	29.1	-2.85	0.610 5600	-155.1	23.07	2.16	12	43.8

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"			"	"	h	m
Nov. 16	4	26	8.08	-1.358	+20	46	29.1	-2.87	0.610 5600	-155.1	23.07	2.16	12	43.8
17	4	25	35.32	1.371	20	45	19.8	2.91	0.610 2038	141.7	23.09	2.16	12	39.3
18	4	25	2.27	1.382	20	44	9.6	2.94	0.609 8800	128.1	23.11	2.16	12	34.9
19	4	24	28.96	1.393	20	42	58.7	2.97	0.609 5887	114.6	23.13	2.16	12	30.4
20	4	23	55.40	1.403	20	41	47.0	3.00	0.609 3301	100.9	23.14	2.16	12	25.9
21	4	23	21.64	-1.411	+20	40	34.6	-3.03	0.609 1044	- 87.1	23.15	2.16	12	21.4
22	4	22	47.69	1.418	20	39	21.6	3.05	0.608 9118	73.4	23.16	2.17	12	16.9
23	4	22	13.57	1.424	20	38	8.1	3.08	0.608 7523	59.5	23.17	2.17	12	12.4
24	4	21	39.33	1.429	20	36	54.0	3.10	0.608 6262	45.6	23.18	2.17	12	7.9
25	4	21	4.97	1.433	20	35	39.5	3.11	0.608 5334	31.7	23.18	2.17	12	3.4
26	4	20	30.54	-1.436	+20	34	24.5	-3.13	0.608 4741	- 17.7	23.18	2.17	11	58.9
27	4	19	56.05	1.438	20	33	9.2	3.14	0.608 4483	- 3.8	23.19	2.17	11	54.4
28	4	19	21.53	1.439	20	31	53.7	3.15	0.608 4561	+ 10.2	23.19	2.17	11	49.9
29	4	18	47.00	1.438	20	30	37.9	3.16	0.608 4975	24.2	23.18	2.17	11	45.4
30	4	18	12.49	1.437	20	29	22.0	3.17	0.608 5725	38.2	23.18	2.17	11	40.9
Dec. 1	4	17	38.03	-1.434	+20	28	5.9	-3.17	0.608 6810	+ 52.2	23.18	2.17	11	36.4
2	4	17	3.65	1.431	20	26	49.9	3.17	0.608 8231	66.2	23.18	2.17	11	31.9
3	4	16	29.36	1.426	20	25	33.9	3.17	0.608 9987	80.1	23.16	2.17	11	27.4
4	4	15	55.20	1.421	20	24	17.9	3.16	0.609 2077	94.0	23.15	2.16	11	22.9
5	4	15	21.18	1.414	20	23	2.2	3.15	0.609 4501	107.9	23.13	2.16	11	18.4
6	4	14	47.34	-1.406	+20	21	46.6	-3.14	0.609 7257	+121.7	23.12	2.16	11	13.9
7	4	14	13.71	1.397	20	20	31.4	3.13	0.610 0344	135.5	23.10	2.16	11	9.4
8	4	13	40.30	1.387	20	19	16.5	3.11	0.610 3761	149.2	23.08	2.16	11	4.9
9	4	13	7.14	1.376	20	18	2.2	3.09	0.610 7505	162.8	23.06	2.16	11	0.4
10	4	12	34.27	1.363	20	16	48.3	3.06	0.611 1576	176.3	23.04	2.15	10	56.0
11	4	12	1.70	-1.350	+20	15	35.1	-3.04	0.611 5969	+189.8	23.02	2.15	10	51.5
12	4	11	29.46	1.336	20	14	22.5	3.01	0.612 0684	203.1	22.99	2.15	10	47.0
13	4	10	57.58	1.320	20	13	10.6	2.98	0.612 5717	216.3	22.97	2.15	10	42.6
14	4	10	26.08	1.304	20	11	59.6	2.94	0.613 1064	229.3	22.94	2.14	10	38.1
15	4	9	54.99	1.286	20	10	49.5	2.90	0.613 6722	242.2	22.91	2.14	10	33.7
16	4	9	24.33	-1.268	+20	9	40.4	-2.86	0.614 2687	+254.9	22.88	2.14	10	29.2
17	4	8	54.12	1.249	20	8	32.3	2.82	0.614 8955	267.4	22.85	2.14	10	24.8
18	4	8	24.39	1.228	20	7	25.2	2.77	0.615 5522	279.8	22.81	2.13	10	20.4
19	4	7	55.16	1.207	20	6	19.4	2.72	0.616 2383	291.9	22.77	2.13	10	16.0
20	4	7	26.45	1.185	20	5	14.8	2.66	0.616 9533	303.8	22.74	2.13	10	11.6
21	4	6	58.28	-1.162	+20	4	11.5	-2.61	0.617 6968	+315.6	22.70	2.12	10	7.2
22	4	6	30.67	1.138	20	3	9.6	2.55	0.618 4681	327.1	22.66	2.12	10	2.8
23	4	6	3.64	1.114	20	2	9.1	2.49	0.619 2668	338.4	22.62	2.11	9	58.4
24	4	5	37.20	1.089	20	1	10.1	2.43	0.620 0924	349.5	22.57	2.11	9	54.1
25	4	5	11.37	1.063	20	0	12.6	2.36	0.620 9443	360.3	22.53	2.11	9	49.7
26	4	4	46.16	-1.037	+19	59	16.7	-2.29	0.621 8220	+371.0	22.48	2.10	9	45.4
27	4	4	21.59	1.010	19	58	22.5	2.22	0.622 7250	381.4	22.44	2.10	9	41.0
28	4	3	57.68	0.982	19	57	30.0	2.15	0.623 6526	391.6	22.39	2.09	9	36.7
29	4	3	34.44	0.954	19	56	39.3	2.08	0.624 6045	401.6	22.34	2.09	9	32.4
30	4	3	11.89	0.925	19	55	50.4	2.00	0.625 5800	411.3	22.29	2.08	9	28.1
31	4	2	50.04	-0.896	+19	55	3.4	-1.92	0.626 5786	+420.8	22.24	2.08	9	23.8
32	4	2	28.89	...	+19	54	18.3	...	0.627 6000	...	22.19	2.07	9	19.5

JUPITER, 1917.  
FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		°	'	"	'	"	°	'	"	"		
Jan.	1	36	39	41.0	5	27.38	-1	9	54.8	+3.40	0.696 5008	+126.6
	5	37	1	30.4	5	27.30	1	9	41.1	3.44	0.696 5518	128.4
	9	37	23	19.4	5	27.22	1	9	27.3	3.48	0.696 6035	130.2
	13	37	45	8.1	5	27.14	1	9	13.3	3.52	0.696 6560	132.1
	17	38	6	56.5	5	27.06	1	8	59.1	3.57	0.696 7092	133.9
Feb.	21	38	28	44.6	5	26.98	-1	8	44.7	+3.61	0.696 7631	+135.8
	25	38	50	32.3	5	26.89	1	8	30.2	3.65	0.696 8178	137.5
	29	39	12	19.7	5	26.81	1	8	15.5	3.69	0.696 8731	139.3
	2	39	34	6.8	5	26.72	1	8	0.7	3.73	0.696 9292	141.1
	6	39	55	53.5	5	26.64	1	7	45.7	3.77	0.696 9860	142.9
	10	40	17	39.9	5	26.55	-1	7	30.5	+3.81	0.697 0435	+144.5
	14	40	39	25.9	5	26.46	1	7	15.2	3.84	0.697 1016	146.2
	18	41	1	11.6	5	26.38	1	6	59.8	3.88	0.697 1605	148.1
	22	41	22	56.9	5	26.29	1	6	44.2	3.93	0.697 2201	149.8
	26	41	44	41.9	5	26.20	1	6	28.4	3.97	0.697 2804	151.6
Mar.	2	42	6	26.5	5	26.10	-1	6	12.4	+4.01	0.697 3414	+153.3
	6	42	28	10.7	5	26.00	1	5	56.3	4.04	0.697 4030	155.0
	10	42	49	54.5	5	25.91	1	5	40.1	4.08	0.697 4654	156.7
	14	43	11	38.0	5	25.81	1	5	23.7	4.12	0.697 5284	158.4
	18	43	33	21.0	5	25.71	1	5	7.1	4.16	0.697 5921	160.1
	22	43	55	3.7	5	25.62	-1	4	50.4	+4.19	0.697 6565	+161.9
	26	44	16	46.0	5	25.52	1	4	33.6	4.22	0.697 7216	163.5
	30	44	38	27.9	5	25.42	1	4	16.6	4.26	0.697 7873	165.1
Apr.	3	45	0	9.4	5	25.32	1	3	59.5	4.30	0.697 8537	166.9
	7	45	21	50.5	5	25.22	1	3	42.2	4.35	0.697 9208	168.5
	11	45	43	31.2	5	25.11	-1	3	24.7	+4.39	0.697 9885	+170.0
	15	46	5	11.4	5	25.01	1	3	7.1	4.41	0.698 0568	171.7
	19	46	26	51.3	5	24.91	1	2	49.4	4.45	0.698 1259	173.4
	23	46	48	30.7	5	24.81	1	2	31.5	4.49	0.698 1955	175.0
	27	47	10	9.8	5	24.70	1	2	13.5	4.52	0.698 2659	176.7
May	1	47	31	48.3	5	24.59	-1	1	55.3	+4.56	0.698 3369	+178.3
	5	47	53	26.5	5	24.49	1	1	37.0	4.59	0.698 4085	179.8
	9	48	15	4.2	5	24.38	1	1	18.6	4.62	0.698 4807	181.4
	13	48	36	41.5	5	24.28	1	1	0.0	4.66	0.698 5536	183.0
	17	48	58	18.4	5	24.16	1	0	41.3	4.70	0.698 6271	184.6
	21	49	19	54.8	5	24.04	-1	0	22.4	+4.74	0.698 7013	+186.2
	25	49	41	30.7	5	23.93	1	0	3.4	4.76	0.698 7761	187.8
	29	50	3	6.2	5	23.82	0	59	44.3	4.80	0.698 8515	189.3
June	2	50	24	41.3	5	23.71	0	59	25.0	4.84	0.698 9275	190.8
	6	50	46	15.9	5	23.59	0	59	5.6	4.86	0.699 0041	192.3
	10	51	7	50.0	5	23.46	-0	58	46.1	+4.89	0.699 0813	+193.9
	14	51	29	23.6	5	23.35	0	58	26.5	4.92	0.699 1592	195.4
	18	51	50	56.8	5	23.24	0	58	6.7	4.96	0.699 2376	196.8
	22	52	12	29.5	5	23.12	0	57	46.8	5.00	0.699 3166	198.4
	26	52	34	1.8	5	23.00	0	57	26.7	5.04	0.699 3963	199.9
July	30	52	55	33.5	5	22.88	-0	57	6.5	+5.06	0.699 4765	+201.3
	4	53	17	4.8	5	22.76	-0	56	46.2	+5.09	0.699 5573	+202.7

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
July	4	53 17 4.8	5 22.76	-26.8	-0 56 46.2	+5.09	0.699 5573	+202.7
	8	53 38 35.6	5 22.64	26.8	0 56 25.8	5.12	0.699 6387	204.2
	12	54 0 5.9	5 22.51	26.8	0 56 5.2	5.16	0.699 7207	205.6
	16	54 21 35.7	5 22.39	26.9	0 55 44.5	5.19	0.699 8032	207.0
	20	54 43 5.0	5 22.26	26.9	0 55 23.7	5.21	0.699 8863	208.5
	24	55 4 33.8	5 22.14	-26.9	-0 55 2.8	+5.24	0.699 9700	+210.0
	28	55 26 2.1	5 22.01	26.8	0 54 41.8	5.27	0.700 0543	211.5
Aug.	1	55 47 29.9	5 21.89	26.8	0 54 20.6	5.30	0.700 1392	212.9
	5	56 8 57.2	5 21.76	26.8	0 53 59.4	5.33	0.700 2246	214.1
	9	56 30 24.0	5 21.64	26.8	0 53 38.0	5.37	0.700 3105	215.5
	13	56 51 50.3	5 21.50	-26.8	-0 53 16.4	+5.40	0.700 3970	+217.0
	17	57 13 16.0	5 21.36	26.8	0 52 54.8	5.42	0.700 4841	218.4
	21	57 34 41.2	5 21.24	26.7	0 52 33.1	5.45	0.700 5717	219.7
	25	57 56 6.0	5 21.11	26.7	0 52 11.2	5.48	0.700 6599	221.0
	29	58 17 30.1	5 20.98	26.6	0 51 49.2	5.50	0.700 7485	222.4
Sept.	2	58 38 53.8	5 20.85	-26.6	-0 51 27.2	+5.53	0.700 8378	+223.7
	6	59 0 16.9	5 20.71	26.6	0 51 5.0	5.56	0.700 9275	225.0
	10	59 21 39.5	5 20.58	26.5	0 50 42.7	5.59	0.701 0178	226.4
	14	59 43 1.5	5 20.45	26.4	0 50 20.3	5.62	0.701 1086	227.6
	18	60 4 23.1	5 20.31	26.4	0 49 57.7	5.65	0.701 1999	228.9
	22	60 25 44.0	5 20.17	-26.3	-0 49 35.1	+5.67	0.701 2917	+230.1
	26	60 47 4.4	5 20.04	26.2	0 49 12.4	5.70	0.701 3840	231.5
	30	61 8 24.3	5 19.90	26.2	0 48 49.5	5.72	0.701 4769	232.7
Oct.	4	61 29 43.6	5 19.76	26.1	0 48 26.6	5.75	0.701 5702	233.9
	8	61 51 2.4	5 19.62	26.0	0 48 3.5	5.77	0.701 6640	235.0
	12	62 12 20.6	5 19.48	-25.9	-0 47 40.4	+5.79	0.701 7582	+236.2
	16	62 33 38.2	5 19.34	25.8	0 47 17.2	5.81	0.701 8530	237.6
	20	62 54 55.3	5 19.20	25.8	0 46 53.9	5.85	0.701 9483	238.8
	24	63 16 11.8	5 19.06	25.7	0 46 30.4	5.87	0.702 0440	239.9
	28	63 37 27.8	5 18.92	25.6	0 46 6.9	5.89	0.702 1402	241.0
Nov.	1	63 58 43.2	5 18.78	-25.4	-0 45 43.3	+5.92	0.702 2368	+242.2
	5	64 19 58.0	5 18.63	25.3	0 45 19.5	5.94	0.702 3340	243.4
	9	64 41 12.2	5 18.49	25.2	0 44 55.7	5.96	0.702 4315	244.5
	13	65 2 25.9	5 18.35	25.1	0 44 31.8	5.99	0.702 5296	245.7
	17	65 23 39.0	5 18.20	25.0	0 44 7.8	6.01	0.702 6281	246.8
	21	65 44 51.5	5 18.05	-24.9	-0 43 43.7	+6.03	0.702 7270	+247.9
	25	66 6 3.4	5 17.90	24.7	0 43 19.6	6.05	0.702 8264	249.0
	29	66 27 14.7	5 17.76	24.6	0 42 55.3	6.07	0.702 9262	250.1
Dec.	3	66 48 25.5	5 17.61	24.5	0 42 31.0	6.09	0.703 0265	251.2
	7	67 9 35.6	5 17.46	24.3	0 42 6.6	6.12	0.703 1272	252.3
	11	67 30 45.2	5 17.32	-24.2	-0 41 42.0	+6.15	0.703 2283	+253.3
	15	67 51 54.2	5 17.17	24.0	0 41 17.4	6.17	0.703 3298	254.3
	19	68 13 2.6	5 17.01	23.9	0 40 52.7	6.19	0.703 4317	255.4
	23	68 34 10.3	5 16.86	23.7	0 40 27.9	6.20	0.703 5341	256.5
	27	68 55 17.5	5 16.72	23.6	0 40 3.1	6.22	0.703 6369	257.4
	31	69 16 24.1	5 16.56	-23.4	-0 39 38.2	+6.24	0.703 7400	+258.4
	35	69 37 30.0	5 16.41	-23.3	-0 39 13.2	+6.26	0.703 8436	+259.5

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GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Feb. 16	7 47 32.20	-0.658	+21 24 29.2	+1.91	0.914 6740	+196.9	9.43	1.07	10 2.2
17	7 47 16.57	0.644	21 25 14.6	1.87	0.915 1534	202.5	9.42	1.07	9 58.0
18	7 47 1.27	0.631	21 25 59.0	1.83	0.915 6459	207.9	9.41	1.07	9 53.8
19	7 46 46.30	0.617	21 26 42.4	1.79	0.916 1514	213.3	9.40	1.07	9 49.6
20	7 46 31.68	0.602	21 27 24.8	1.75	0.916 6697	218.5	9.38	1.07	9 45.4
21	7 46 17.40	-0.588	+21 28 6.2	+1.70	0.917 2004	+223.7	9.37	1.06	9 41.3
22	7 46 3.48	0.572	21 28 46.6	1.66	0.917 7433	228.7	9.36	1.06	9 37.1
23	7 45 49.93	0.557	21 29 26.0	1.62	0.918 2981	233.6	9.35	1.06	9 33.0
24	7 45 36.75	0.541	21 30 4.3	1.57	0.918 8646	238.4	9.34	1.06	9 28.8
25	7 45 23.95	0.525	21 30 41.5	1.53	0.919 4425	243.1	9.32	1.06	9 24.7
26	7 45 11.54	-0.509	+21 31 17.7	+1.48	0.920 0315	+247.6	9.31	1.06	9 20.5
27	7 44 59.52	0.492	21 31 52.7	1.44	0.920 6312	252.1	9.30	1.06	9 16.4
28	7 44 47.91	0.476	21 32 26.7	1.39	0.921 2415	256.4	9.29	1.05	9 12.3
Mar. 1	7 44 36.69	0.459	21 32 59.5	1.34	0.921 8619	260.6	9.27	1.05	9 8.2
2	7 44 25.88	0.442	21 33 31.2	1.30	0.922 4923	264.7	9.26	1.05	9 4.1
3	7 44 15.49	-0.424	+21 34 1.8	+1.25	0.923 1324	+268.7	9.25	1.05	9 0.0
4	7 44 5.51	0.407	21 34 31.3	1.21	0.923 7820	272.5	9.23	1.05	8 55.9
5	7 43 55.96	0.389	21 34 59.7	1.16	0.924 4406	276.3	9.22	1.05	8 51.8
6	7 43 46.84	0.371	21 35 27.0	1.11	0.925 1081	279.9	9.20	1.05	8 47.7
7	7 43 38.15	0.353	21 35 53.1	1.06	0.925 7841	283.4	9.19	1.04	8 43.6
8	7 43 29.89	-0.335	+21 36 18.1	+1.02	0.926 4683	+286.8	9.18	1.04	8 39.6
9	7 43 22.07	0.317	21 36 42.0	0.97	0.927 1605	290.0	9.16	1.04	8 35.5
10	7 43 14.69	0.298	21 37 4.8	0.92	0.927 8605	293.2	9.15	1.04	8 31.4
11	7 43 7.75	0.280	21 37 26.4	0.88	0.928 5680	296.3	9.13	1.04	8 27.4
12	7 43 1.26	0.261	21 37 46.8	0.83	0.929 2826	299.2	9.12	1.04	8 23.4
13	7 42 55.22	-0.242	+21 38 6.1	+0.78	0.930 0043	+302.1	9.10	1.03	8 19.3
14	7 42 49.64	0.223	21 38 24.3	0.73	0.930 7326	304.8	9.09	1.03	8 15.3
15	7 42 44.51	0.204	21 38 41.3	0.68	0.931 4673	307.4	9.07	1.03	8 11.3
16	7 42 39.83	0.185	21 38 57.1	0.64	0.932 2081	309.9	9.06	1.03	8 7.3
17	7 42 35.62	0.166	21 39 11.8	0.59	0.932 9549	312.3	9.04	1.03	8 3.3
18	7 42 31.87	-0.147	+21 39 25.3	+0.54	0.933 7072	+314.6	9.02	1.03	7 59.3
19	7 42 28.58	0.128	21 39 37.6	0.49	0.934 4649	316.8	9.01	1.02	7 55.3
20	7 42 25.76	0.108	21 39 48.8	0.44	0.935 2276	318.8	8.99	1.02	7 51.4
21	7 42 23.41	0.088	21 39 58.8	0.39	0.935 9951	320.7	8.98	1.02	7 47.4
22	7 42 21.53	0.068	21 40 7.6	0.34	0.936 7671	322.5	8.96	1.02	7 43.4
23	7 42 20.13	-0.049	+21 40 15.2	+0.29	0.937 5433	+324.2	8.94	1.02	7 39.5
24	7 42 19.19	0.029	21 40 21.7	0.24	0.938 3234	326.8	8.93	1.01	7 35.5
25	7 42 18.73	-0.010	21 40 26.9	0.19	0.939 1071	327.2	8.91	1.01	7 31.6
26	7 42 18.74	+0.010	21 40 31.0	0.15	0.939 8941	328.6	8.90	1.01	7 27.6
27	7 42 19.22	0.030	21 40 33.9	0.10	0.940 6842	329.8	8.88	1.01	7 23.7
28	7 42 20.18	+0.049	+21 40 35.6	+0.05	0.941 4770	+330.8	8.86	1.01	7 19.8
29	7 42 21.60	0.069	21 40 36.1	0.00	0.942 2723	331.8	8.85	1.01	7 15.9
30	7 42 23.50	0.089	21 40 35.5	-0.05	0.943 0697	332.7	8.83	1.00	7 12.0
31	7 42 25.87	0.109	21 40 33.7	0.10	0.943 8691	333.4	8.82	1.00	7 8.1
Apr. 1	7 42 28.70	0.128	21 40 30.7	0.15	0.944 6702	334.1	8.80	1.00	7 4.3
2	7 42 32.00	+0.147	+21 40 26.6	-0.20	0.945 4727	+334.6	8.78	1.00	7 0.4
3	7 42 35.77	+0.167	+21 40 21.3	-0.24	0.946 2764	+335.1	8.77	1.00	6 56.5



**SATURN, 1917.**  
**GREENWICH MEAN TIME.**

**187**



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.	
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.		
	h m s	s	° ' "	"			"	"	h m	
July	1	8 12 36.27	+1.285	+20 22 16.8	-3.85	1.001 0123	+112.1	7.73	0.88	1 36.5
	2	8 13 7.17	1.289	20 20 44.1	3.88	1.001 2764	108.0	7.72	0.88	1 33.1
	3	8 13 38.16	1.293	20 19 10.8	3.90	1.001 5307	103.9	7.72	0.88	1 29.7
	4	8 14 9.24	1.297	20 17 36.9	3.92	1.001 7752	99.8	7.71	0.88	1 26.3
	5	8 14 40.42	1.301	20 16 2.4	3.95	1.002 0099	95.7	7.71	0.87	1 22.8
	6	8 15 11.68	+1.304	+20 14 27.2	-3.98	1.002 2346	+ 91.6	7.71	0.87	1 19.4
	7	8 15 43.02	1.307	20 12 51.5	4.00	1.002 4495	87.5	7.70	0.87	1 16.0
	8	8 16 14.43	1.310	20 11 15.1	4.03	1.002 6544	83.3	7.70	0.87	1 12.6
	9	8 16 45.92	1.314	20 9 38.1	4.05	1.002 8493	79.1	7.70	0.87	1 9.2
	10	8 17 17.49	1.317	20 8 0.6	4.08	1.003 0342	75.0	7.69	0.87	1 5.8
	11	8 17 49.12	+1.319	+20 6 22.5	-4.10	1.003 2091	+ 70.8	7.69	0.87	1 2.4
	12	8 18 20.80	1.321	20 4 43.8	4.12	1.003 3739	66.6	7.69	0.87	0 59.0
	13	8 18 52.55	1.324	20 3 4.6	4.14	1.003 5286	62.4	7.68	0.87	0 55.6
	14	8 19 24.35	1.326	20 1 24.9	4.17	1.003 6732	58.1	7.68	0.87	0 52.2
	15	8 19 56.21	1.328	19 59 44.6	4.19	1.003 8077	53.9	7.68	0.87	0 48.8
	16	8 20 28.10	+1.330	+19 58 3.9	-4.21	1.003 9319	+ 49.6	7.68	0.87	0 45.4
	17	8 21 0.04	1.331	19 56 22.7	4.23	1.004 0459	45.4	7.67	0.87	0 42.0
	18	8 21 32.01	1.333	19 54 41.0	4.25	1.004 1496	41.1	7.67	0.87	0 38.6
	19	8 22 4.01	1.334	19 52 58.9	4.26	1.004 2431	36.8	7.67	0.87	0 35.2
	20	8 22 36.03	1.335	19 51 16.3	4.28	1.004 3262	32.5	7.67	0.87	0 31.8
	21	8 23 8.07	+1.335	+19 49 33.3	-4.30	1.004 3989	+ 28.2	7.67	0.87	0 28.3
	22	8 23 40.13	1.336	19 47 49.9	4.32	1.004 4613	23.9	7.67	0.87	0 24.9
	23	8 24 12.21	1.336	19 46 6.1	4.33	1.004 5134	19.6	7.67	0.87	0 21.5
	24	8 24 44.28	1.336	19 44 22.0	4.35	1.004 5552	15.3	7.67	0.87	0 18.2
	25	8 25 16.36	1.336	19 42 37.5	4.36	1.004 5868	11.0	7.67	0.87	0 14.8
	26	8 25 48.43	+1.336	+19 40 52.6	-4.38	1.004 6082	+ 6.8	7.66	0.87	0 11.4
	27	8 26 20.50	1.336	19 39 7.5	4.39	1.004 6194	+ 2.5	7.66	0.87	0 7.9
	28	8 26 52.55	1.335	19 37 22.0	4.40	1.004 6203	- 1.8	7.66	0.87	0 4.5
	29	8 27 24.59	1.335	19 35 36.2	4.41	1.004 6109	6.1	7.66	0.87	0 1.1
	30	8 27 56.61	1.334	19 33 50.1	4.43	1.004 5912	10.3	7.67	0.87	23 57.7
	31	8 28 28.61	+1.333	+19 32 3.8	-4.44	1.004 5613	- 14.6	7.67	0.87	23 54.3
Aug.	1	8 29 0.58	1.331	19 30 17.2	4.45	1.004 5211	18.9	7.67	0.87	23 50.9
	2	8 29 32.51	1.330	19 28 30.4	4.46	1.004 4707	23.1	7.67	0.87	23 47.5
	3	8 30 4.41	1.328	19 26 43.3	4.46	1.004 4102	27.4	7.67	0.87	23 44.1
	4	8 30 36.27	1.327	19 24 56.1	4.47	1.004 3394	31.6	7.67	0.87	23 40.7
	5	8 31 8.09	+1.325	+19 23 8.7	-4.48	1.004 2584	- 35.9	7.67	0.87	23 37.3
	6	8 31 39.86	1.323	19 21 21.1	4.49	1.004 1672	40.1	7.67	0.87	23 33.9
	7	8 32 11.59	1.321	19 19 33.4	4.49	1.004 0658	44.4	7.67	0.87	23 30.5
	8	8 32 43.25	1.318	19 17 45.5	4.50	1.003 9542	48.6	7.68	0.87	23 27.1
	9	8 33 14.86	1.316	19 15 57.5	4.50	1.003 8324	52.9	7.68	0.87	23 23.7
	10	8 33 46.41	+1.313	+19 14 9.4	-4.51	1.003 7003	- 57.2	7.68	0.87	23 20.3
	11	8 34 17.89	1.310	19 12 21.2	4.51	1.003 5579	61.4	7.68	0.87	23 16.9
	12	8 34 49.29	1.307	19 10 32.9	4.51	1.003 4054	65.7	7.68	0.87	23 13.5
	13	8 35 20.62	1.304	19 8 44.6	4.51	1.003 2427	69.9	7.69	0.87	23 10.0
	14	8 35 51.87	1.300	19 6 56.2	4.51	1.003 0698	74.2	7.69	0.87	23 6.6
	15	8 36 23.03	+1.297	+19 5 7.9	-4.51	1.002 8867	- 78.4	7.70	0.87	23 3.2
	16	8 36 54.10	+1.293	+19 3 19.5	-4.51	1.002 6935	- 82.6	7.70	0.87	22 59.8

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Aug. 16	8 36 54.10	+1.293	+19 3 19.5	-4.51	1.002 6935	- 82.6	7.70	0.87	22 56.4
17	8 37 25.07	1.289	19 1 31.3	4.51	1.002 4900	86.9	7.70	0.87	22 53.0
18	8 37 55.95	1.284	18 59 43.1	4.51	1.002 2762	91.2	7.71	0.87	22 49.6
19	8 38 26.72	1.280	18 57 55.0	4.50	1.002 0523	95.4	7.71	0.87	22 46.1
20	8 38 57.38	1.275	18 56 7.0	4.50	1.001 8183	99.6	7.71	0.88	22 42.7
21	8 39 27.93	+1.270	+18 54 19.1	-4.49	1.001 5742	-103.8	7.72	0.88	22 39.3
22	8 39 58.36	1.265	18 52 31.4	4.49	1.001 3202	107.9	7.72	0.88	22 35.8
23	8 40 28.67	1.260	18 50 43.8	4.48	1.001 0562	112.1	7.73	0.88	22 32.4
24	8 40 58.86	1.255	18 48 56.4	4.47	1.000 7823	116.2	7.73	0.88	22 29.0
25	8 41 28.91	1.249	18 47 9.2	4.46	1.000 4985	120.3	7.74	0.88	22 25.5
26	8 41 58.82	+1.243	+18 45 22.3	-4.45	1.000 2048	-124.4	7.74	0.88	22 22.1
27	8 42 28.59	1.238	18 43 35.6	4.44	0.999 9013	128.5	7.75	0.88	22 18.6
28	8 42 58.22	1.231	18 41 49.1	4.43	0.999 5881	132.5	7.75	0.88	22 15.2
29	8 43 27.70	1.225	18 40 3.0	4.41	0.999 2651	136.6	7.76	0.88	22 11.8
30	8 43 57.03	1.219	18 38 17.2	4.40	0.998 9325	140.6	7.76	0.88	22 8.3
31	8 44 26.21	+1.212	+18 36 31.7	-4.39	0.998 5903	-144.6	7.77	0.88	22 4.9
Sept. 1	8 44 55.22	1.205	18 34 46.6	4.37	0.998 2386	148.6	7.78	0.88	22 1.4
2	8 45 24.07	1.199	18 33 1.8	4.36	0.997 8772	152.6	7.78	0.88	21 58.0
3	8 45 52.76	1.192	18 31 17.4	4.34	0.997 5063	156.5	7.79	0.88	21 54.5
4	8 46 21.27	1.184	18 29 33.5	4.32	0.997 1259	160.5	7.80	0.88	21 51.0
5	8 46 49.61	+1.177	+18 27 50.0	-4.30	0.996 7360	-164.4	7.80	0.89	21 47.6
6	8 47 17.77	1.170	18 26 6.9	4.29	0.996 3368	168.3	7.81	0.89	21 44.1
7	8 47 45.75	1.162	18 24 24.3	4.26	0.995 9282	172.2	7.82	0.89	21 40.6
8	8 48 13.53	1.154	18 22 42.2	4.24	0.995 5102	176.1	7.83	0.89	21 37.2
9	8 48 41.13	1.146	18 21 0.6	4.22	0.995 0829	180.0	7.83	0.89	21 33.7
10	8 49 8.52	+1.137	+18 19 19.6	-4.20	0.994 6464	-183.8	7.84	0.89	21 30.2
11	8 49 35.72	1.129	18 17 39.2	4.17	0.994 2007	187.6	7.85	0.89	21 26.7
12	8 50 2.71	1.120	18 15 59.3	4.15	0.993 7459	191.4	7.86	0.89	21 23.2
13	8 50 29.49	1.111	18 14 20.2	4.12	0.993 2820	195.2	7.87	0.89	21 19.8
14	8 50 56.05	1.102	18 12 41.7	4.09	0.992 8091	198.9	7.87	0.90	21 16.3
15	8 51 22.39	+1.093	+18 11 3.9	-4.06	0.992 3272	-202.6	7.88	0.90	21 12.8
16	8 51 48.50	1.083	18 9 26.8	4.03	0.991 8364	206.3	7.89	0.90	21 9.3
17	8 52 14.39	1.074	18 7 50.4	4.00	0.991 3368	210.0	7.90	0.90	21 5.8
18	8 52 40.03	1.064	18 6 14.8	3.97	0.990 8284	213.6	7.91	0.90	21 2.2
19	8 53 5.44	1.054	18 4 40.0	3.94	0.990 3113	217.2	7.92	0.90	20 58.7
20	8 53 30.61	+1.044	+18 3 5.9	-3.90	0.989 7857	-220.8	7.93	0.90	20 55.2
21	8 53 55.53	1.033	18 1 32.8	3.86	0.989 2517	224.3	7.94	0.90	20 51.7
22	8 54 20.19	1.022	18 0 0.5	3.83	0.988 7093	227.7	7.95	0.90	20 48.2
23	8 54 44.59	1.011	17 58 29.1	3.79	0.988 1587	231.1	7.96	0.90	20 44.6
24	8 55 8.73	1.000	17 56 58.6	3.75	0.987 5999	234.5	7.97	0.91	20 41.1
25	8 55 32.61	+0.989	+17 55 29.0	-3.71	0.987 0331	-237.8	7.98	0.91	20 37.6
26	8 55 56.22	0.978	17 54 0.4	3.67	0.986 4583	241.1	7.99	0.91	20 34.0
27	8 56 19.56	0.967	17 52 32.7	3.63	0.985 8757	244.4	8.00	0.91	20 30.5
28	8 56 42.62	0.955	17 51 6.0	3.59	0.985 2853	247.6	8.01	0.91	20 26.9
29	8 57 5.40	0.943	17 49 40.4	3.54	0.984 6872	250.8	8.02	0.91	20 23.4
30	8 57 27.89	+0.931	+17 48 15.9	-3.50	0.984 0816	-253.9	8.04	0.91	20 19.8
Oct. 1	8 57 50.09	+0.919	+17 46 52.4	-3.46	0.983 4685	-257.0	8.05	0.91	20 16.2



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Nov. 16	9	8	30.33	+0.191	+17	8	49.8	-0.39	0.949 5119	-332.1	8.70	0.99	17 25.7
17	9	8	34.68	0.172	17	8	41.4	0.31	0.948 7153	331.7	8.72	0.99	17 21.9
18	9	8	38.58	0.153	17	8	35.0	0.23	0.947 9199	331.1	8.73	0.99	17 18.0
19	9	8	42.02	0.134	17	8	30.6	0.14	0.947 1259	330.5	8.75	0.99	17 14.1
20	9	8	45.02	0.116	17	8	28.1	-0.06	0.946 3334	329.8	8.76	1.00	17 10.2
21	9	8	47.57	+0.097	+17	8	27.7	+0.02	0.945 5428	-329.0	8.78	1.00	17 6.3
22	9	8	49.67	0.078	17	8	29.2	0.11	0.944 7543	328.1	8.80	1.00	17 2.4
23	9	8	51.32	0.059	17	8	32.8	0.19	0.943 9681	327.0	8.81	1.00	16 58.5
24	9	8	52.52	0.041	17	8	38.3	0.27	0.943 1846	325.9	8.83	1.00	16 54.6
25	9	8	53.27	0.022	17	8	45.8	0.35	0.942 4040	324.6	8.84	1.00	16 50.7
26	9	8	53.57	+0.003	+17	8	55.3	+0.44	0.941 6266	-323.2	8.86	1.01	16 46.8
27	9	8	53.42	-0.015	17	9	6.7	0.52	0.940 8526	321.7	8.88	1.01	16 42.8
28	9	8	52.82	0.034	17	9	20.1	0.60	0.940 0823	320.2	8.89	1.01	16 38.9
29	9	8	51.77	0.053	17	9	35.4	0.68	0.939 3158	318.5	8.91	1.01	16 34.9
30	9	8	50.27	0.072	17	9	52.7	0.76	0.938 5535	316.7	8.92	1.01	16 31.0
Dec. 1	9	8	48.33	-0.090	+17	10	12.0	+0.85	0.937 7956	-314.8	8.94	1.02	16 27.0
2	9	8	45.94	0.109	17	10	33.3	0.93	0.937 0424	312.8	8.95	1.02	16 23.0
3	9	8	43.10	0.128	17	10	56.5	1.01	0.936 2942	310.6	8.97	1.02	16 19.0
4	9	8	39.81	0.146	17	11	21.6	1.09	0.935 5514	308.4	8.99	1.02	16 15.0
5	9	8	36.08	0.165	17	11	48.7	1.17	0.934 8141	306.0	9.00	1.02	16 11.0
6	9	8	31.91	-0.183	+17	12	17.7	+1.25	0.934 0827	-303.5	9.02	1.02	16 7.0
7	9	8	27.29	0.202	17	12	48.6	1.33	0.933 3574	300.9	9.03	1.03	16 3.0
8	9	8	22.23	0.220	17	13	21.5	1.41	0.932 6385	298.1	9.05	1.03	15 59.0
9	9	8	16.73	0.238	17	13	56.2	1.49	0.931 9264	295.2	9.06	1.03	15 55.0
10	9	8	10.79	0.256	17	14	32.8	1.56	0.931 2213	292.2	9.07	1.03	15 50.9
11	9	8	4.43	-0.274	+17	15	11.3	+1.64	0.930 5236	-289.2	9.09	1.03	15 46.9
12	9	7	57.63	0.292	17	15	51.7	1.72	0.929 8335	285.9	9.10	1.03	15 42.8
13	9	7	50.40	0.310	17	16	33.8	1.79	0.929 1514	282.5	9.12	1.04	15 38.8
14	9	7	42.75	0.328	17	17	17.8	1.87	0.928 4776	279.0	9.13	1.04	15 34.7
15	9	7	34.67	0.345	17	18	3.5	1.94	0.927 8123	275.4	9.15	1.04	15 30.7
16	9	7	26.18	-0.362	+17	18	51.0	+2.01	0.927 1559	-271.6	9.16	1.04	15 26.6
17	9	7	17.27	0.380	17	19	40.2	2.09	0.926 5086	267.8	9.17	1.04	15 22.5
18	9	7	7.96	0.396	17	20	31.1	2.15	0.925 8708	263.7	9.19	1.04	15 18.4
19	9	6	58.25	0.413	17	21	23.6	2.22	0.925 2427	259.6	9.20	1.05	15 14.3
20	9	6	48.14	0.429	17	22	17.8	2.30	0.924 6246	255.4	9.21	1.05	15 10.2
21	9	6	37.64	-0.446	+17	23	13.7	+2.36	0.924 0167	-251.1	9.23	1.05	15 6.1
22	9	6	26.75	0.461	17	24	11.1	2.42	0.923 4194	246.6	9.24	1.05	15 2.0
23	9	6	15.49	0.477	17	25	10.0	2.49	0.922 8328	242.1	9.25	1.05	14 57.9
24	9	6	3.85	0.493	17	26	10.5	2.55	0.922 2573	237.4	9.26	1.05	14 53.7
25	9	5	51.84	0.508	17	27	12.4	2.61	0.921 6931	232.7	9.28	1.05	14 49.6
26	9	5	39.48	-0.522	+17	28	15.7	+2.67	0.921 1403	-227.9	9.29	1.06	14 45.4
27	9	5	26.76	0.537	17	29	20.5	2.73	0.920 5993	222.9	9.30	1.06	14 41.3
28	9	5	13.69	0.552	17	30	26.6	2.78	0.920 0702	217.9	9.31	1.06	14 37.2
29	9	5	0.27	0.566	17	31	34.1	2.84	0.919 5533	212.8	9.32	1.06	14 33.0
30	9	4	46.52	0.580	17	32	42.9	2.89	0.919 0489	207.5	9.33	1.06	14 28.8
31	9	4	32.44	-0.594	+17	33	53.0	+2.95	0.918 5573	-202.1	9.34	1.06	14 24.7
32	9	4	18.03	. . .	+17	35	4.4	. . .	0.918 0786	. . .	9.35	1.06	14 20.5



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.		Var. per Day.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.			Noon.	Noon.		Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"				"	"	h m
Jan.	3	21	21 21.53	+11.851	-16	11	12.3	+55.96	1.317 1981		+2099.8	1.62	0.43	2 30.8
	7	21	22 9.72	12.239	16	7	24.6	57.83	1.317 9972		1895.1	1.61	0.42	2 15.9
	11	21	22 59.38	12.584	16	3	29.9	59.52	1.318 7134		1684.8	1.61	0.42	2 1.0
	15	21	23 50.33	12.886	15	59	28.7	61.03	1.319 3442		1468.1	1.61	0.42	1 46.1
	19	21	24 42.41	13.147	15	55	21.9	62.34	1.319 8871		1245.5	1.60	0.42	1 31.2
	23	21	25 35.44	+13.358	-15	51	10.2	+63.47	1.320 3399		+1017.5	1.60	0.42	1 16.4
	27	21	26 29.21	13.519	15	46	54.5	64.33	1.320 7006		785.6	1.60	0.42	1 1.6
	31	21	27 23.53	13.632	15	42	35.9	64.95	1.320 9682		552.6	1.60	0.42	0 46.7
Feb.	4	21	28 18.20	13.698	15	38	15.2	65.37	1.321 1426		319.1	1.60	0.42	0 31.9
	8	21	29 13.05	13.718	15	33	53.2	65.60	1.321 2234		+ 85.0	1.60	0.42	0 17.0
	12	21	30 7.89	+13.696	-15	29	30.7	+65.61	1.321 2106		- 148.9	1.60	0.42	{ 0 23 58.4
	16	21	31 2.56	13.630	15	25	8.6	65.39	1.321 1044		381.9	1.60	0.42	23 43.7
	20	21	31 56.87	13.518	15	20	47.9	64.96	1.320 9052		614.3	1.60	0.42	23 28.9
	24	21	32 50.64	13.357	15	16	29.3	64.27	1.320 6133		844.3	1.60	0.42	23 14.1
	28	21	33 43.66	13.145	15	12	14.1	63.33	1.320 2304		1069.3	1.60	0.42	22 59.2
Mar.	4	21	34 35.75	+12.895	-15	8	2.9	+62.21	1.319 7586		-1288.8	1.61	0.42	22 44.4
	8	21	35 26.77	12.607	15	3	56.7	60.86	1.319 2001		1502.7	1.61	0.42	22 29.5
	12	21	36 16.55	12.278	14	59	56.3	59.33	1.318 5572		1710.7	1.61	0.42	22 14.6
	16	21	37 4.94	11.909	14	56	2.4	57.57	1.317 8323		1913.0	1.61	0.42	21 59.6
	20	21	37 51.77	11.502	14	52	16.0	55.61	1.317 0277		2108.8	1.62	0.42	21 44.7
	24	21	38 36.90	+11.054	-14	48	37.8	+53.42	1.316 1464		-2296.1	1.62	0.42	21 29.7
	28	21	39 20.15	10.565	14	45	8.9	51.03	1.315 1922		2473.1	1.62	0.43	21 14.7
Apr.	1	21	40 1.38	10.046	14	41	49.8	48.46	1.314 1694		2638.7	1.63	0.43	20 59.6
	5	21	40 40.48	9.496	14	38	41.4	45.73	1.313 0826		2794.1	1.63	0.43	20 44.5
	9	21	41 17.31	8.917	14	35	44.1	42.86	1.311 9355		2939.3	1.63	0.43	20 29.4
	13	21	41 51.79	+ 8.314	-14	32	58.7	+39.81	1.310 7327		-3072.7	1.64	0.43	20 14.3
	17	21	42 23.78	7.678	14	30	25.8	36.61	1.309 4789		3194.6	1.64	0.43	19 59.1
	21	21	42 53.18	7.017	14	28	6.0	33.25	1.308 1787		3304.0	1.65	0.43	19 43.8
	25	21	43 19.88	6.329	14	26	0.0	29.75	1.306 8377		3398.1	1.65	0.43	19 28.5
	29	21	43 43.79	5.624	14	24	8.1	26.18	1.305 4622		3477.2	1.66	0.43	19 13.2
May	3	21	44 4.85	+ 4.903	-14	22	30.7	+22.51	1.304 0579		-3541.5	1.66	0.44	18 57.8
	7	21	44 23.00	4.172	14	21	8.1	18.79	1.302 6310		3590.7	1.67	0.44	18 42.3
	11	21	44 38.21	3.430	14	20	0.5	14.98	1.301 1873		3625.5	1.68	0.44	18 26.9
	15	21	44 50.42	2.674	14	19	8.3	11.12	1.299 7326		3645.7	1.68	0.44	18 11.3
	19	21	44 59.59	1.908	14	18	31.6	7.23	1.298 2730		3648.8	1.69	0.44	17 55.7
	23	21	45 5.68	+ 1.138	-14	18	10.5	+ 3.30	1.296 8159		-3634.0	1.69	0.44	17 40.1
	27	21	45 8.70	+ 0.373	14	18	5.2	- 0.61	1.295 3681		3601.9	1.70	0.45	17 24.4
	31	21	45 8.67	- 0.386	14	18	15.3	4.45	1.293 9367		3552.1	1.70	0.45	17 8.7
June	4	21	45 5.62	1.137	14	18	40.7	8.24	1.292 5285		3487.1	1.71	0.45	16 52.9
	8	21	44 59.59	1.876	14	19	21.1	11.95	1.291 1492		3405.9	1.71	0.45	16 37.0
	12	21	44 50.63	- 2.602	-14	20	16.2	-15.60	1.289 8060		-3308.2	1.72	0.45	16 21.1
	16	21	44 38.79	3.316	14	21	25.8	19.16	1.288 5049		3194.0	1.72	0.45	16 5.2
	20	21	44 24.13	4.007	14	22	49.3	22.59	1.287 2532		3061.2	1.73	0.45	15 49.2
	24	21	44 6.77	4.670	14	24	26.3	25.86	1.286 0581		2912.4	1.73	0.45	15 33.2
	28	21	43 46.81	5.301	14	26	15.9	28.91	1.284 9253		2748.2	1.74	0.46	15 17.2
July	2	21	43 24.41	- 5.894	-14	28	17.3	-31.77	1.283 8614		-2570.0	1.74	0.46	15 1.1
	6	21	42 59.70	- 6.455	-14	30	29.8	-34.43	1.282 8710		-2379.2	1.75	0.46	14 44.9

URANUS, 1917.  
GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"			"	"	h	m
July 2	21	43	24.41	-5.894	-14	28	17.3	-31.77	1.283 8614	-2570.0	1.74	0.46	15	1.1
6	21	42	59.70	6.455	14	30	29.8	34.43	1.282 8710	2379.2	1.75	0.46	14	44.9
10	21	42	32.82	6.977	14	32	52.5	36.89	1.281 9598	2175.1	1.75	0.46	14	28.7
14	21	42	3.94	7.458	14	35	24.6	39.12	1.281 1326	1958.6	1.75	0.46	14	12.5
18	21	41	33.22	7.892	14	38	5.1	41.08	1.280 3946	1729.3	1.76	0.46	13	56.3
22	21	41	0.87	- 8.274	-14	40	52.9	-42.76	1.279 7506	-1489.0	1.76	0.46	13	40.0
26	21	40	27.10	8.599	14	43	46.8	44.15	1.279 2046	1239.9	1.76	0.46	13	23.7
30	21	39	52.15	8.868	14	46	45.7	45.22	1.278 7596	984.0	1.76	0.46	13	7.4
Aug. 3	21	39	16.23	9.080	14	49	48.2	46.01	1.278 4180	723.8	1.77	0.46	12	51.1
7	21	38	39.58	9.238	14	52	53.4	46.51	1.278 1812	458.4	1.77	0.46	12	34.8
11	21	38	2.40	- 9.339	-14	56	0.0	-46.72	1.278 0518	- 188.8	1.77	0.46	12	18.4
15	21	37	24.95	9.377	14	59	6.8	46.63	1.278 0305	+ 83.7	1.77	0.46	12	2.1
19	21	36	47.47	9.351	15	2	12.6	46.20	1.278 1188	356.5	1.77	0.46	11	45.7
23	21	36	10.23	9.259	15	5	16.0	45.45	1.278 3155	627.5	1.77	0.46	11	29.4
27	21	35	33.48	9.104	15	8	15.8	44.40	1.278 6204	895.7	1.76	0.46	11	13.0
31	21	34	57.48	- 8.888	-15	11	10.8	-43.05	1.279 0313	+1157.4	1.76	0.46	10	56.7
Sept. 4	21	34	22.45	8.618	15	13	59.9	41.48	1.279 5455	1412.7	1.76	0.46	10	40.4
8	21	33	48.61	8.298	15	16	42.3	39.65	1.280 1606	1661.9	1.76	0.46	10	24.1
12	21	33	16.18	7.910	15	19	16.7	37.50	1.280 8740	1903.9	1.76	0.46	10	7.9
16	21	32	45.41	7.468	15	21	42.0	35.13	1.281 6824	2135.9	1.75	0.46	9	51.7
20	21	32	16.51	- 6.972	-15	23	57.4	-32.51	1.282 5810	+2354.7	1.75	0.46	9	35.5
24	21	31	49.70	6.428	15	26	1.8	29.68	1.283 5644	2560.6	1.74	0.46	9	19.3
28	21	31	25.14	5.844	15	27	54.6	26.68	1.284 6275	2751.5	1.74	0.46	9	3.1
Oct. 2	21	31	3.00	5.220	15	29	35.0	23.52	1.285 7636	2927.5	1.74	0.46	8	47.0
6	21	30	43.43	4.561	15	31	2.5	20.20	1.286 9676	3089.6	1.73	0.45	8	31.0
10	21	30	26.56	- 3.867	-15	32	16.4	-16.75	1.288 2332	+3236.3	1.73	0.45	8	15.0
14	21	30	12.54	3.139	15	33	16.3	13.16	1.289 5544	3366.2	1.72	0.45	7	59.0
18	21	30	1.48	2.387	15	34	1.5	9.44	1.290 9237	3477.4	1.72	0.45	7	43.1
22	21	29	53.47	1.616	15	34	31.7	5.64	1.292 3338	3569.9	1.71	0.45	7	27.3
26	21	29	48.59	0.828	15	34	46.6	- 1.83	1.293 7771	3643.3	1.70	0.45	7	11.5
30	21	29	46.86	- 0.034	-15	34	46.3	+ 1.99	1.295 2461	+3699.3	1.70	0.45	6	55.7
Nov. 3	21	29	48.33	+ 0.768	15	34	30.6	5.86	1.296 7342	3737.8	1.69	0.44	6	40.0
7	21	29	53.01	1.572	15	33	59.4	9.75	1.298 2340	3758.6	1.69	0.44	6	24.4
11	21	30	0.91	2.379	15	33	12.6	13.64	1.299 7387	3761.8	1.68	0.44	6	8.8
15	21	30	12.04	3.186	15	32	10.3	17.51	1.301 2410	3746.7	1.67	0.44	5	53.2
19	21	30	26.38	+ 3.981	-15	30	52.6	+21.33	1.302 7335	+3712.3	1.67	0.44	5	37.7
23	21	30	43.86	4.756	15	29	19.8	25.04	1.304 2085	3660.3	1.66	0.44	5	22.3
27	21	31	4.40	5.512	15	27	32.4	28.67	1.305 6596	3592.3	1.66	0.43	5	6.9
Dec. 1	21	31	27.93	6.250	15	25	30.5	32.24	1.307 0804	3510.1	1.65	0.43	4	51.6
5	21	31	54.37	6.966	15	23	14.6	35.69	1.308 4656	3412.3	1.65	0.43	4	36.3
9	21	32	23.63	+ 7.660	-15	20	45.1	+39.04	1.309 8082	+3299.0	1.64	0.43	4	21.1
13	21	32	55.61	8.326	15	18	2.4	42.29	1.311 1030	3172.4	1.64	0.43	4	5.9
17	21	33	30.19	8.958	15	15	7.0	45.38	1.312 3442	3030.8	1.63	0.43	3	50.7
21	21	34	7.22	9.551	15	11	59.6	48.29	1.313 5259	2876.1	1.63	0.43	3	35.6
25	21	34	46.55	10.109	15	8	40.9	51.04	1.314 6437	2711.5	1.62	0.43	3	20.5
29	21	35	28.04	+10.629	-15	5	11.5	+53.62	1.315 6938	+2537.2	1.62	0.43	3	5.5
33	21	36	11.52	. . . .	-15	1	32.3	. . .	1.316 6720	. . . .	1.62	0.42	2	50.5



FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	5	319 19 28.8	39.13	+7.0	-0 42 15.4	-0.22	1.300 2137	+18.8
	15	319 26 0.1	39.13	7.0	0 42 17.6	0.22	1.300 2325	18.8
	25	319 32 31.4	39.12	7.0	0 42 19.8	0.21	1.300 2513	18.8
Feb.	4	319 39 2.6	39.12	+7.0	-0 42 21.9	-0.21	1.300 2700	+18.7
	14	319 45 33.7	39.11	6.9	0 42 24.0	0.21	1.300 2886	18.6
	24	319 52 4.8	39.11	6.9	0 42 26.1	0.21	1.300 3071	18.6
Mar.	6	319 58 35.9	39.10	+6.9	-0 42 28.2	-0.21	1.300 3257	+18.5
	16	320 5 6.9	39.10	6.9	0 42 30.3	0.21	1.300 3441	18.4
	26	320 11 37.9	39.10	6.8	0 42 32.4	0.21	1.300 3624	18.3
Apr.	5	320 18 8.8	39.09	+6.8	-0 42 34.5	-0.21	1.300 3806	+18.2
	15	320 24 39.7	39.09	6.8	0 42 36.6	0.21	1.300 3989	18.2
	25	320 31 10.5	39.08	6.8	0 42 38.6	0.20	1.300 4171	18.1
May	5	320 37 41.3	39.08	+6.7	-0 42 40.7	-0.20	1.300 4352	+18.0
	15	320 44 12.0	39.07	6.7	0 42 42.7	0.20	1.300 4531	17.9
	25	320 50 42.7	39.07	6.7	0 42 44.8	0.20	1.300 4710	17.9
June.	4	320 57 13.4	39.06	+6.7	-0 42 46.8	-0.20	1.300 4889	+17.8
	14	321 3 44.0	39.06	6.6	0 42 48.8	0.20	1.300 5067	17.8
	24	321 10 14.6	39.06	6.6	0 42 50.8	0.20	1.300 5244	17.7
July	4	321 16 45.1	39.05	+6.6	-0 42 52.8	-0.20	1.300 5421	+17.7
	14	321 23 15.6	39.05	6.6	0 42 54.8	0.20	1.300 5597	17.6
	24	321 29 46.1	39.04	6.5	0 42 56.8	0.20	1.300 5772	17.5
Aug.	3	321 36 16.5	39.04	+6.5	-0 42 58.8	-0.20	1.300 5947	+17.5
	13	321 42 46.8	39.03	6.5	0 43 0.8	0.19	1.300 6121	17.4
	23	321 49 17.1	39.03	6.4	0 43 2.7	0.19	1.300 6295	17.3
Sept.	2	321 55 47.4	39.02	+6.4	-0 43 4.6	-0.19	1.300 6468	+17.3
	12	322 2 17.6	39.02	6.4	0 43 6.5	0.19	1.300 6640	17.2
	22	322 8 47.8	39.02	6.4	0 43 8.5	0.19	1.300 6811	17.1
Oct.	2	322 15 18.0	39.01	+6.4	-0 43 10.4	-0.19	1.300 6982	+17.1
	12	322 21 48.1	39.01	6.3	0 43 12.3	0.19	1.300 7152	17.0
	22	322 28 18.1	39.00	6.3	0 43 14.2	0.19	1.300 7322	16.9
Nov.	1	322 34 48.1	39.00	+6.3	-0 43 16.1	-0.19	1.300 7491	+16.8
	11	322 41 18.1	39.00	6.2	0 43 17.9	0.18	1.300 7658	16.7
	21	322 47 48.1	38.99	6.2	0 43 19.8	0.18	1.300 7826	16.7
Dec.	1	322 54 18.0	38.99	+6.2	-0 43 21.6	-0.18	1.300 7993	+16.6
	11	323 0 47.8	38.98	6.2	0 43 23.5	0.18	1.300 8159	16.6
	21	323 7 17.6	38.98	6.1	0 43 25.3	0.18	1.300 8324	16.5
	31	323 13 47.4	38.97	+6.1	-0 43 27.2	-0.18	1.300 8489	+16.5
	41	323 20 17.1	38.97	+6.1	-0 43 29.0	-0.18	1.300 8654	+16.4



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.		
	Noon.				Noon.									Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h	m	
Jan.	3	8	25	19.89	-6.346	+19	0	58.6	+22.35	1.463 9859	- 944.7	1.33	0.30	13	32.9
	7	8	24	54.08	6.554	19	2	29.4	23.04	1.463 6430	770.4	1.33	0.30	13	16.7
	11	8	24	27.51	6.722	19	4	2.7	23.57	1.463 3701	592.4	1.33	0.30	13	0.6
	15	8	24	0.36	6.849	19	5	37.8	23.97	1.463 1697	409.3	1.33	0.30	12	44.4
	19	8	23	32.78	6.930	19	7	14.3	24.24	1.463 0430	223.7	1.33	0.30	12	28.2
	23	8	23	4.98	-6.964	+19	8	51.5	+24.31	1.462 9910	- 36.1	1.33	0.30	12	12.0
	27	8	22	37.13	6.950	19	10	28.6	24.22	1.463 0141	+ 151.1	1.33	0.30	11	55.8
	31	8	22	9.44	6.888	19	12	5.1	23.99	1.463 1116	336.2	1.33	0.30	11	39.7
Feb.	4	8	21	42.08	6.783	19	13	40.3	23.60	1.463 2827	519.0	1.33	0.30	11	23.5
	8	8	21	15.23	6.637	19	15	13.7	23.07	1.463 5263	697.9	1.33	0.30	11	7.3
	12	8	20	49.04	-6.448	+19	16	44.7	+22.39	1.463 8404	+ 871.9	1.33	0.30	10	51.1
	16	8	20	23.70	6.218	19	18	12.7	21.61	1.464 2233	1042.5	1.33	0.30	10	35.0
	20	8	19	59.35	5.948	19	19	37.4	20.68	1.464 6736	1207.0	1.33	0.30	10	18.9
	24	8	19	36.17	5.636	19	20	58.0	19.62	1.465 1879	1363.9	1.32	0.30	10	2.8
	28	8	19	14.31	5.288	19	22	14.2	18.46	1.465 7635	1511.8	1.32	0.30	9	46.7
	Mar.	4	8	18	53.91	-4.907	+19	23	25.5	+17.18	1.466 3960	+1649.7	1.32	0.30	9
8	8	18	35.09	4.498	19	24	31.5	15.83	1.467 0820	1778.5	1.32	0.30	9	14.6	
12	8	18	17.96	4.063	19	25	32.0	14.39	1.467 8175	1897.7	1.32	0.30	8	58.6	
16	8	18	2.62	3.604	19	26	26.5	12.87	1.468 5988	2007.1	1.31	0.30	8	42.6	
20	8	17	49.16	3.123	19	27	14.9	11.28	1.469 4217	2105.2	1.31	0.30	8	26.6	
24	8	17	37.67	-2.616	+19	27	56.7	+ 9.63	1.470 2815	+2192.5	1.31	0.30	8	10.7	
28	8	17	28.25	2.094	19	28	31.9	7.92	1.471 1740	2267.1	1.31	0.30	7	54.9	
Apr.	1	8	17	20.93	1.564	19	29	0.2	6.19	1.472 0935	2328.9	1.30	0.30	7	39.0
	5	8	17	15.75	1.023	19	29	21.4	4.44	1.473 0356	2379.6	1.30	0.30	7	23.2
	9	8	17	12.75	-0.478	19	29	35.7	2.70	1.473 9956	2418.1	1.30	0.30	7	7.4
	13	8	17	11.93	+0.070	+19	29	42.9	+ 0.89	1.474 9686	+2445.7	1.29	0.29	6	51.7
	17	8	17	13.32	0.625	19	29	42.8	- 0.93	1.475 9507	2462.5	1.29	0.29	6	36.0
	21	8	17	16.93	1.179	19	29	35.4	2.74	1.476 9370	2467.2	1.29	0.29	6	20.3
	25	8	17	22.75	1.730	19	29	20.9	4.52	1.477 9228	2459.5	1.29	0.29	6	4.7
	29	8	17	30.76	2.272	19	28	59.2	6.32	1.478 9030	2439.8	1.28	0.29	5	49.1
May	3	8	17	40.91	+2.802	+19	28	30.4	- 8.07	1.479 8732	+2409.2	1.28	0.29	5	33.5
	7	8	17	53.16	3.321	19	27	54.7	9.78	1.480 8291	2369.3	1.28	0.29	5	18.0
	11	8	18	7.46	3.826	19	27	12.2	11.47	1.481 7674	2320.6	1.27	0.29	5	2.5
	15	8	18	23.75	4.318	19	26	23.0	13.13	1.482 6842	2261.5	1.27	0.29	4	47.1
	19	8	18	41.99	4.798	19	25	27.2	14.75	1.483 5753	2192.5	1.27	0.29	4	31.6
	23	8	19	2.11	+5.258	+19	24	25.1	-16.31	1.484 4370	+2114.5	1.27	0.29	4	16.2
	27	8	19	24.03	5.698	19	23	16.8	17.82	1.485 2657	2027.6	1.26	0.29	4	0.9
	31	8	19	47.66	6.111	19	22	2.6	19.26	1.486 0580	1932.7	1.26	0.29	3	45.6
June	4	8	20	12.89	6.501	19	20	42.8	20.63	1.486 8110	1830.7	1.26	0.29	3	30.2
	8	8	20	39.64	6.870	19	19	17.6	21.95	1.487 5217	1722.5	1.26	0.29	3	14.9
	12	8	21	7.82	+7.217	+19	17	47.3	-23.20	1.488 1882	+1608.9	1.26	0.29	2	59.7
	16	8	21	37.34	7.537	19	16	12.1	24.39	1.488 8079	1487.9	1.25	0.29	2	44.5
	20	8	22	8.08	7.830	19	14	32.3	25.49	1.489 3777	1360.7	1.25	0.28	2	29.3
	24	8	22	39.94	8.095	19	12	48.3	26.49	1.489 8958	1228.5	1.25	0.28	2	14.1
28	8	23	12.80	8.331	19	11	0.5	27.40	1.490 3599	1091.5	1.25	0.28	1	58.9	
July	2	8	23	46.55	+8.536	+19	9	9.2	-28.23	1.490 7686	+ 951.4	1.25	0.28	1	43.7
	6	8	24	21.05	+8.710	+19	7	14.8	-28.96	1.491 1207	+ 809.2	1.25	0.28	1	28.6

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"			"	"	h m	
July	2	8	23	46.55	+8.536	+19	9	9.2	-28.23	1.490 7686	+ 951.4	1.25	0.28	1 43.7
	6	8	24	21.05	8.710	19	7	14.8	28.96	1.491 1207	809.2	1.25	0.28	1 28.6
	10	8	24	56.20	8.861	19	5	17.6	29.63	1.491 4155	663.5	1.25	0.28	1 13.4
	14	8	25	31.90	8.983	19	3	17.9	30.19	1.491 6511	514.7	1.25	0.28	0 58.3
	18	8	26	8.02	9.073	19	1	16.2	30.66	1.491 8269	363.3	1.25	0.28	0 43.1
	22	8	26	44.44	+9.129	+18	59	12.8	-30.99	1.491 9415	+ 210.2	1.25	0.28	0 28.0
	26	8	27	21.02	9.153	18	57	8.4	31.22	1.491 9950	+ 56.8	1.25	0.28	0 12.9
	30	8	27	57.62	9.145	18	55	3.2	31.34	1.491 9869	- 97.0	1.25	0.28	23 54.0
Aug.	3	8	28	34.13	9.108	18	52	57.8	31.37	1.491 9176	248.8	1.25	0.28	23 38.9
	7	8	29	10.45	9.047	18	50	52.4	31.29	1.491 7879	400.6	1.25	0.28	23 23.7
	11	8	29	46.46	+8.952	+18	48	47.6	-31.11	1.491 5971	- 552.9	1.25	0.28	23 8.6
	15	8	30	22.02	8.824	18	46	43.7	30.79	1.491 3458	703.3	1.25	0.28	22 53.4
Sept.	19	8	30	57.01	8.665	18	44	41.4	30.37	1.491 0348	851.4	1.25	0.28	22 38.3
	23	8	31	31.30	8.475	18	42	40.9	29.83	1.490 6651	996.1	1.25	0.28	22 23.1
	27	8	32	4.77	8.255	18	40	42.9	29.15	1.490 2384	1137.1	1.25	0.28	22 7.9
	31	8	32	37.30	+8.007	+18	38	47.8	-28.38	1.489 7560	-1273.9	1.25	0.28	21 52.8
	4	8	33	8.79	7.733	18	36	56.0	27.52	1.489 2199	1406.0	1.25	0.28	21 37.6
	8	8	33	39.13	7.433	18	35	7.8	26.55	1.488 6318	1533.7	1.25	0.29	21 22.3
	12	8	34	8.22	7.105	18	33	23.8	25.42	1.487 9936	1656.8	1.26	0.29	21 7.1
	16	8	34	35.93	6.746	18	31	44.5	24.22	1.487 3072	1773.8	1.26	0.29	20 51.8
	20	8	35	2.15	+6.360	+18	30	10.2	-22.91	1.486 5756	-1883.1	1.26	0.29	20 36.5
	24	8	35	26.78	5.952	18	28	41.4	21.46	1.485 8018	1984.4	1.26	0.29	20 21.2
	28	8	35	49.74	5.523	18	27	18.6	19.95	1.484 9892	2077.5	1.27	0.29	20 5.9
	Oct.	2	8	36	10.94	5.074	18	26	1.9	18.36	1.484 1409	2162.6	1.27	0.29
6		8	36	30.31	4.607	18	24	51.8	16.69	1.483 2602	2239.9	1.27	0.29	19 35.1
10		8	36	47.77	+4.119	+18	23	48.5	-14.93	1.482 3502	-2308.0	1.27	0.29	19 19.6
14		8	37	3.24	3.613	18	22	52.5	13.07	1.481 4152	2365.8	1.28	0.29	19 4.1
18		8	37	16.65	3.089	18	22	4.0	11.16	1.480 4590	2413.1	1.28	0.29	18 48.6
22		8	37	27.94	2.555	18	21	23.3	9.19	1.479 4863	2448.5	1.28	0.29	18 33.1
26		8	37	37.08	2.014	18	20	50.5	7.19	1.478 5017	2472.5	1.28	0.29	18 17.5
30		8	37	44.04	+1.465	+18	20	25.8	- 5.15	1.477 5098	-2485.4	1.29	0.29	18 1.9
Nov.	3	8	37	48.79	0.911	18	20	9.3	3.10	1.476 5148	2487.8	1.29	0.29	17 46.2
	7	8	37	51.32	+0.353	18	20	1.0	- 1.03	1.475 5212	2477.7	1.29	0.29	17 30.5
	11	8	37	51.61	-0.206	18	20	1.1	+ 1.08	1.474 5343	2455.1	1.30	0.29	17 14.8
	15	8	37	49.67	0.765	18	20	9.6	3.17	1.473 5588	2420.0	1.30	0.30	16 59.0
	19	8	37	45.50	-1.316	+18	20	26.4	+ 5.22	1.472 6001	-2371.4	1.30	0.30	16 43.2
Dec.	23	8	37	39.16	1.855	18	20	51.3	7.23	1.471 6634	2310.1	1.30	0.30	16 27.4
	27	8	37	30.68	2.381	18	21	24.2	9.20	1.470 7536	2237.3	1.31	0.30	16 11.5
	1	8	37	20.13	2.891	18	22	4.8	11.09	1.469 8751	2153.2	1.31	0.30	15 55.6
	5	8	37	7.57	3.387	18	22	52.8	12.92	1.469 0326	2057.7	1.31	0.30	15 39.7
	9	8	36	53.06	-3.861	+18	23	48.1	+14.69	1.468 2305	-1950.4	1.32	0.30	15 23.7
	13	8	36	36.71	4.312	18	24	50.2	16.36	1.467 4739	1830.8	1.32	0.30	15 7.7
	17	8	36	18.60	4.735	18	25	58.8	17.91	1.466 7673	1700.8	1.32	0.30	14 51.7
	21	8	35	58.87	5.126	18	27	13.3	19.33	1.466 1146	1560.7	1.32	0.30	14 35.6
	25	8	35	37.64	5.481	18	28	33.3	20.62	1.465 5199	1412.1	1.32	0.30	14 19.5
	29	8	35	15.07	-5.794	+18	29	58.1	+21.77	1.464 9859	-1256.6	1.33	0.30	14 3.4
	33	8	34	51.29	....	+18	31	27.3	....	1.464 5158	....	1.33	0.30	13 47.3

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	5	123 22 54.7	21.74	-12.8	-0 13 53.4	+0.67	1.477 4598	+4.8
	15	123 26 32.1	21.74	12.7	0 13 46.7	0.67	1.477 4647	4.8
	25	123 30 9.5	21.74	12.6	0 13 40.0	0.67	1.477 4695	4.8
Feb.	4	123 33 47.0	21.74	-12.5	-0 13 33.3	+0.67	1.477 4743	+4.8
	14	123 37 24.4	21.74	12.4	0 13 26.7	0.67	1.477 4792	4.8
	24	123 41 1.8	21.74	12.3	0 13 20.0	0.67	1.477 4840	4.8
Mar.	6	123 44 39.2	21.74	-12.2	-0 13 13.4	+0.67	1.477 4889	+4.8
	16	123 48 16.7	21.74	12.1	0 13 6.7	0.67	1.477 4937	4.8
	26	123 51 54.1	21.74	12.0	0 13 0.1	0.67	1.477 4986	4.8
Apr.	5	123 55 31.6	21.74	-11.9	-0 12 53.4	+0.67	1.477 5034	+4.8
	15	123 59 9.0	21.74	11.8	0 12 46.7	0.67	1.477 5082	4.8
	25	124 2 46.5	21.74	11.7	0 12 40.0	0.67	1.477 5130	4.8
May	5	124 6 23.9	21.74	-11.6	-0 12 33.4	+0.67	1.477 5178	+4.8
	15	124 10 1.4	21.74	11.5	0 12 26.7	0.67	1.477 5226	4.8
	25	124 13 38.8	21.74	11.4	0 12 20.0	0.67	1.477 5274	4.8
June	4	124 17 16.3	21.74	-11.3	-0 12 13.3	+0.67	1.477 5322	+4.8
	14	124 20 53.7	21.75	11.2	0 12 6.7	0.67	1.477 5370	4.8
	24	124 24 31.2	21.75	11.1	0 12 0.0	0.67	1.477 5418	4.8
July	4	124 28 8.6	21.75	-11.0	-0 11 53.3	+0.67	1.477 5466	+4.8
	14	124 31 46.1	21.75	10.9	0 11 46.6	0.67	1.477 5513	4.8
	24	124 35 23.5	21.75	10.8	0 11 39.9	0.67	1.477 5561	4.8
Aug.	3	124 39 1.0	21.75	-10.7	-0 11 33.2	+0.67	1.477 5609	+4.8
	13	124 42 38.5	21.75	10.6	0 11 26.5	0.67	1.477 5657	4.8
	23	124 46 16.0	21.75	10.5	0 11 19.8	0.67	1.477 5704	4.8
Sept.	2	124 49 53.4	21.75	-10.4	-0 11 13.2	+0.67	1.477 5752	+4.7
	12	124 53 30.9	21.75	10.3	0 11 6.5	0.67	1.477 5799	4.7
	22	124 57 8.4	21.75	10.2	0 10 59.8	0.67	1.477 5847	4.7
Oct.	2	125 0 45.9	21.75	-10.1	-0 10 53.1	+0.67	1.477 5894	+4.7
	12	125 4 23.3	21.75	10.0	0 10 46.4	0.67	1.477 5941	4.7
	22	125 8 0.8	21.75	9.9	0 10 39.7	0.67	1.477 5988	4.7
Nov.	1	125 11 38.3	21.75	- 9.8	-0 10 33.0	+0.67	1.477 6035	+4.7
	11	125 15 15.8	21.75	9.7	0 10 26.3	0.67	1.477 6082	4.7
	21	125 18 53.3	21.75	9.6	0 10 19.7	0.67	1.477 6129	4.7
Dec.	1	125 22 30.8	21.75	- 9.5	-0 10 13.0	+0.67	1.477 6176	+4.7
	11	125 26 8.3	21.75	9.4	0 10 6.3	0.67	1.477 6223	4.7
	21	125 29 45.8	21.75	9.3	0 9 59.6	0.67	1.477 6269	4.7
	31	125 33 23.3	21.75	- 9.2	-0 9 52.9	+0.67	1.477 6316	+4.7
	41	125 37 0.8	21.75	- 9.1	-0 9 46.2	+0.67	1.477 6362	+4.6

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## PART II.

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# ASTRONOMICAL EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

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# 200 FORMULÆ FOR THE REDUCTION OF STARS, 1917.

The constants of precession, nutation and aberration adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in May, 1896, are given on page xviii, and together with the notation of BESSEL are used in the formulæ which follow.

## BESSELIAN STAR-NUMBERS.

<i>Terms of Long Period.</i>	<i>Terms of Short Period.</i>
$A = \tau - 0.342\ 20 \sin \Omega$	$-0.004\ 05 \sin 2 \mathcal{C}$
$+ 0.004\ 15 \sin 2 \Omega$	$+0.000\ 23 \sin (\mathcal{C} + \Gamma')$
$- 0.025\ 26 \sin 2 L$	$+0.001\ 34 \sin (\mathcal{C} - \Gamma')$
$+ 0.002\ 51 \sin (L - \Gamma)$	$-0.000\ 68 \sin (2 \mathcal{C} - \Omega)$
$- 0.000\ 99 \sin (3 L - \Gamma)$	$-0.000\ 52 \sin (3 \mathcal{C} - \Gamma')$
$+ 0.000\ 42 \sin (L + \Gamma)$	$+0.000\ 30 \sin (\mathcal{C} - 2 L + \Gamma')$
$+ 0.000\ 25 \sin (2 L - \Omega)$	$+0.000\ 12 \sin 2 (\mathcal{C} - L)$
$B = - 9.210 \cos \Omega$	$-0.088 \cos 2 \mathcal{C}$
$+ 0.090 \cos 2 \Omega$	$-0.018 \cos (2 \mathcal{C} - \Omega)$
$- 0.552 \cos 2 L$	$-0.011 \cos (3 \mathcal{C} - \Gamma')$
$- 0.022 \cos (3 L - \Gamma)$	$+0.005 \cos (\mathcal{C} + \Gamma')$
$+ 0.009 \cos (L + \Gamma)$	
$+ 0.007 \cos (2 L - \Omega)$	
$C = -20.4700 \cos \omega \cos \odot$	
$D = -20.4700 \sin \odot$	
$E = - 0.0416 \sin \Omega + 0''.0005 \sin 2 \Omega - 0''.0031 \sin 2 L$	

## BESSEL'S Star-Constants.

$a = 3^s.072\ 65 + 1^s.336\ 36 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0454 \cos \alpha_0$
$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$	$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

## Formulæ for reduction to Apparent Position.

$$\begin{aligned} \alpha &= \alpha_0 + \tau \mu + Aa + Bb + Cc + Dd + \frac{1}{15} E & (\text{in time}) \\ \delta &= \delta_0 + \tau \mu' + Aa' + Bb' + Cc' + Dd' & (\text{in arc}) \end{aligned}$$

## INDEPENDENT STAR-NUMBERS.

$$\begin{aligned} f + f' &= +46''.0898 A + E & (\text{in arc}) \\ &= +3^s.07265 A + \frac{1}{15} E & (\text{in time}) \\ f' &= -0^s.0124 \sin 2 \mathcal{C} + 0^s.0041 \sin (\mathcal{C} - \Gamma') + 0^s.0007 \sin (\mathcal{C} + \Gamma') \\ &\quad - 0^s.0021 \sin (2 \mathcal{C} - \Omega) - 0^s.0016 \sin (3 \mathcal{C} - \Gamma') \\ &\quad + 0^s.0009 \sin (\mathcal{C} - 2 L + \Gamma') + 0^s.0004 \sin 2 (\mathcal{C} - L) \\ g \sin G &= B & h \sin H &= C & i &= C \tan \omega \\ g \cos G &= 20''.0454 A & h \cos H &= D \end{aligned}$$

## Formulæ for Reduction to Apparent Position.

$$\begin{aligned} \alpha &= \alpha_0 + f + f' + \tau \mu + \frac{1}{15} g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{15} h \sin (H + \alpha_0) \sec \delta_0 & (\text{in time}) \\ \delta &= \delta_0 + \tau \mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 & (\text{in arc}) \end{aligned}$$

In the above formulæ,

$\tau$  denotes the time reckoned in units of one year, from the beginning of the Besselian fictitious year (1917, January 0<sup>d</sup>.217, Washington mean time),

$\alpha_0, \delta_0$ , the star's mean R. A. and Decl. at the beginning of the fictitious year,  
 $\alpha, \delta$ , the star's apparent right ascension and declination at the time  $\tau$ ,  
 $\mu, \mu'$ , the annual proper motion in right ascension and declination,

$\odot$ , the Sun's true longitude,  
 $L$ , the Sun's mean longitude,  
 $\Omega$ , the longitude of the Moon's ascending node,

$\omega$ , the obliquity of the ecliptic,  
 $\Gamma$ , the long. of the Sun's perigee,  
 $\Gamma'$ , the long. of the Moon's perigee,  
 $\mathcal{C}$ , the Moon's mean longitude.

The independent star-numbers are more convenient than BESSEL's when only one or two apparent positions of a star are required, or when BESSEL's star-constants are not known with sufficient accuracy.

In using the star-constants of the *British Association Catalogue*,  $a, b, c, d, a', b', c', d'$ , with the star-numbers of this Ephemeris, the quantities to be computed are  $Ac, Bd, Ca, Db, -Ac', -Bd', -Ca' - Db'$ .

In the computation of the Besselian star-numbers given for Washington mean midnight of each day of the year, on pages 202–205, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star-numbers, pages 206–213, the short-period terms have been included in the two columns headed  $G$  and  $\text{Log } g$ . The quantities  $f$  and  $f'$  give separately the effect of the long-period and short-period terms.  $f'$  differs but slightly from the quantity  $-0''.1866 \sin 2 \zeta + 0''.0622 \sin (\zeta - I'')$  given on page 37 of the *Procès-Verbaux* of the Paris Conference of 1896, which quantity that conference decided should be omitted in the reduction of stars from mean to apparent place.

In computing the ephemerides of the circumpolar stars in this volume, all short-period terms have been included. The quantity  $f'$ , which was omitted from the ephemerides of the circumpolar stars given in the *American Ephemeris and Nautical Almanac* for the years 1900 to 1915, inclusive, is now included in these ephemerides in accordance with the decision of the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911. See page 43 of *Procès-Verbaux* of that Congress.

In the computation of the ephemerides of the ten-day stars, no short-period terms have been included. These terms attain two maxima and two minima during the tropical month. At maximum and minimum they may amount in right ascension to  $\pm 0''.008 \tan \delta$ , and in declination to  $\pm 0''.13$ . For computing the effect of these terms for the correction of the positions of stars interpolated from the ten-day ephemerides, the following formulæ may be used, in which  $\Delta\alpha$  and  $\Delta\delta$  denote the effect of the short-period terms in right ascension and declination, respectively, and  $\delta''\psi$  and  $\delta''\omega$ , the sum of the short-period terms of the nutation in longitude and obliquity:

$$\begin{aligned}\Delta\alpha &= D_{\psi}\alpha \delta''\psi + D_{\omega}\alpha \delta''\omega \\ \Delta\delta &= D_{\psi}\delta \delta''\psi + D_{\omega}\delta \delta''\omega\end{aligned}$$

The values of  $\delta''\psi$  and of  $\delta''\omega$  for Washington mean midnight are given for each day of the year on pages 215–216, and have been computed as follows:

$$\delta''\psi = 50''.37 A_2$$

$$\delta''\omega = -B_2$$

in which  $A_2$  and  $B_2$  are the sums of the short-period terms given in the expressions for  $A$  and  $B$  on page 200.

The quantities  $D_{\psi}\alpha$ ,  $D_{\omega}\alpha$ ,  $D_{\psi}\delta$ , and  $D_{\omega}\delta$  are given for each ten-day star on pages 316–513, and have been computed by means of the following formulæ:

$$\begin{aligned}D_{\psi}\alpha &= \frac{1}{15} (\cos \omega + \sin \alpha \tan \delta \sin \omega) & D_{\omega}\alpha &= -\frac{1}{15} \cos \alpha \tan \delta \\ D_{\psi}\delta &= \cos \alpha \sin \omega & D_{\omega}\delta &= \sin \alpha\end{aligned}$$

In the *Star List of the American Ephemeris* for the years 1910 and 1911 and in the *American Ephemeris and Nautical Almanac* for the years 1912 to 1915, inclusive, the value used for the derivative of the right ascension with reference to  $\psi$  was

$$D'_{\psi}\alpha = \frac{1}{15} \sin \alpha \tan \delta \sin \omega$$

and the addition of the term  $\frac{1}{15} \cos \omega$  is made in accordance with the above-mentioned decision of the *Congrès International des Éphémérides Astronomiques* of 1911 with reference to the quantity  $f'$ .



BESSELIAN STAR-NUMBERS, 1917.  
FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Jan. 0	+9.51342	-0.4500	-0.52391	+1.30413	Feb. 15	+9.67399	-0.4817	-1.19718	+1.04745
1	9.51677	0.4437	0.56460	1.30267	16	9.67843	0.4821	1.20206	1.03544
2	9.52128	0.4364	0.60168	1.30105	17	9.68278	0.4858	1.20674	1.02296
3	9.52686	0.4297	0.63570	1.29930	h 18	9.68668	0.4922	1.21124	1.00998
h 4	9.53322	0.4252	0.66713	1.29740	(10.0) 19	9.68965	0.5001	1.21557	0.99647
(7.0) 5	+9.53988	-0.4235	-0.69630	+1.29535	20	+9.69167	-0.5077	-1.21971	+0.98239
6	9.54637	0.4248	0.72351	1.29316	21	9.69277	0.5136	1.22368	0.96770
7	9.55236	0.4288	0.74898	1.29082	22	9.69326	0.5167	1.22748	0.95237
8	9.55758	0.4346	0.77290	1.28832	23	9.69364	0.5164	1.23111	0.93634
9	9.56190	0.4411	0.79545	1.28568	24	9.69433	0.5133	1.23458	0.91958
10	+9.56540	-0.4474	-0.81675	+1.28288	25	+9.69562	-0.5084	-1.23788	+0.90200
11	9.56812	0.4528	0.83692	1.27992	26	9.69774	0.5029	1.24103	0.88356
12	9.57019	0.4565	0.85607	1.27681	27	9.70049	0.4983	1.24402	0.86417
13	9.57201	0.4579	0.87427	1.27354	28	9.70370	0.4958	1.24685	0.84375
14	9.57388	0.4568	0.89161	1.27010	Mar. 1	9.70697	0.4957	1.24954	0.82219
15	+9.57616	-0.4534	-0.90815	+1.26650	2	+9.71005	-0.4980	-1.25207	+0.79938
16	9.57933	0.4483	0.92395	1.26272	3	9.71271	0.5022	1.25445	0.77518
17	9.58354	0.4427	0.93906	1.25878	4	9.71483	0.5073	1.25669	0.74943
18	9.58883	0.4382	0.95353	1.25466	5	9.71635	0.5126	1.25878	0.72192
h 19	9.59493	0.4362	0.96740	1.25037	h 6	9.71730	0.5172	1.26073	0.69243
(8.0) 20	+9.60133	-0.4378	-0.98070	+1.24590	(11.0) 7	+9.71780	-0.5206	-1.26254	+0.66066
21	9.60746	0.4430	0.99348	1.24124	8	9.71798	0.5222	1.26421	0.62627
22	9.61271	0.4510	1.00575	1.23639	9	9.71806	0.5217	1.26574	0.58879
23	9.61682	0.4601	1.01756	1.23135	10	9.71829	0.5190	1.26713	0.54764
24	9.61966	0.4683	1.02891	1.22611	11	9.71893	0.5144	1.26838	0.50206
25	+9.62150	-0.4743	-1.03983	+1.22067	12	+9.72021	-0.5085	-1.26950	+0.45101
26	9.62280	0.4769	1.05036	1.21503	13	9.72228	0.5025	1.27049	0.39304
27	9.62410	0.4761	1.06049	1.20918	14	9.72507	0.4976	1.27134	0.32599
28	9.62586	0.4726	1.07026	1.20311	15	9.72839	0.4951	1.27206	0.24655
29	9.62843	0.4675	1.07968	1.19682	16	9.73182	0.4956	1.27265	0.14913
30	+9.63190	-0.4626	-1.08876	+1.19030	17	+9.73500	-0.4990	-1.27310	+0.02325
31	9.63603	0.4592	1.09752	1.18354	18	9.73753	0.5043	1.27342	9.84518
Feb. 1	9.64053	0.4583	1.10597	1.17654	19	9.73924	0.5100	1.27362	+9.53808
2	9.64504	0.4601	1.11412	1.16929	20	9.74009	0.5145	1.27368	-7.98302
h 3	9.64921	0.4645	1.12198	1.16178	h 21	9.74037	0.5164	1.27361	9.56142
(9.0) 4	+9.65284	-0.4706	-1.12957	+1.15400	(12.0) 22	+9.74039	-0.5151	-1.27341	-9.85649
5	9.65577	0.4776	1.13689	1.14595	23	9.74066	0.5106	1.27308	0.03041
6	9.65798	0.4846	1.14395	1.13761	24	9.74145	0.5038	1.27262	0.15410
7	9.65959	0.4907	1.15077	1.12897	25	9.74290	0.4960	1.27203	0.25010
8	9.66068	0.4954	1.15734	1.12002	26	9.74509	0.4884	1.27131	0.32852
9	+9.66142	-0.4980	-1.16368	+1.11075	27	+9.74775	-0.4826	-1.27046	-0.39477
10	9.66211	0.4984	1.16980	1.10114	28	9.75064	0.4792	1.26948	0.45209
11	9.66303	0.4965	1.17569	1.09117	29	9.75344	0.4784	1.26837	0.50258
12	9.66452	0.4928	1.18137	1.08084	30	9.75588	0.4797	1.26713	0.54766
13	9.66683	0.4883	1.18684	1.07012	31	9.75791	0.4824	1.26575	0.58837
14	+9.67004	-0.4841	-1.19211	+1.05900	Apr. 1	+9.75937	-0.4855	-1.26424	-0.62542
15	+9.67399	-0.4817	-1.19718	+1.04745	2	+9.76035	-0.4882	-1.26260	-0.65942

BESSELIAN STAR-NUMBERS, 1917.

203

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Apr. 1	+9.75937	-0.4855	-1.26424	-0.62542	May 17	+9.83469	-0.3062	-1.01346	-1.23314
2	9.76035	0.4882	1.26260	0.65942	18	9.83619	0.2912	1.00215	1.23785
3	9.76090	0.4898	1.26083	0.69082	19	9.83834	0.2752	0.99041	1.24239
4	9.76116	0.4897	1.25892	0.71997	20	9.84100	0.2605	0.97823	1.24675
h 5	9.76130	0.4874	1.25687	0.74714	h 21	9.84402	0.2492	0.96558	1.25098
(13.0) 6	+9.76153	-0.4827	-1.25469	-0.77258	(16.0) 22	+9.84716	-0.2424	-0.95242	-1.25499
7	9.76205	0.4758	1.25237	0.79647	23	9.85012	0.2402	0.93873	1.25887
8	9.76313	0.4672	1.24991	0.81899	24	9.85277	0.2415	0.92448	1.26259
9	9.76490	0.4580	1.24731	0.84026	25	9.85502	0.2448	0.90962	1.26616
10	9.76736	0.4494	1.24456	0.86041	26	9.85681	0.2484	0.89412	1.26957
11	+9.77036	-0.4430	-1.24167	-0.87953	27	+9.85820	-0.2510	-0.87792	-1.27284
12	9.77363	0.4397	1.23864	0.89772	28	9.85931	0.2513	0.86098	1.27596
13	9.77674	0.4401	1.23546	0.91505	29	9.86020	0.2486	0.84322	1.27894
14	9.77938	0.4430	1.23213	0.93158	30	9.86111	0.2422	0.82459	1.28177
15	9.78132	0.4471	1.22865	0.94737	31	9.86218	0.2320	0.80500	1.28446
16	+9.78252	-0.4505	-1.22501	-0.96248	June 1	+9.86355	-0.2185	-0.78438	-1.28702
17	9.78309	0.4515	1.22122	0.97696	2	9.86541	0.2025	0.76260	1.28944
18	9.78335	0.4490	1.21727	0.99083	3	9.86781	0.1863	0.73955	1.29172
19	9.78373	0.4427	1.21315	1.00415	4	9.87073	0.1723	0.71509	1.29387
h 20	9.78453	0.4332	1.20887	1.01695	h 5	9.87400	0.1631	0.68905	1.29589
(14.0) 21	+9.78596	-0.4218	-1.20443	-1.02925	(17.0) 6	+9.87736	-0.1604	-0.66122	-1.29778
22	9.78809	0.4102	1.19981	1.04108	7	9.88052	0.1642	0.63137	1.29954
23	9.79074	0.4001	1.19502	1.05247	8	9.88321	0.1723	0.59918	1.30117
24	9.79369	0.3928	1.19006	1.06344	9	9.88528	0.1817	0.56430	1.30268
25	9.79665	0.3887	1.18491	1.07401	10	9.88672	0.1889	0.52624	1.30406
26	+9.79938	-0.3875	-1.17957	-1.08420	11	+9.88774	-0.1912	-0.48439	-1.30531
27	9.80174	0.3884	1.17405	1.09403	12	9.88856	0.1871	0.43795	1.30644
28	9.80362	0.3903	1.16833	1.10351	13	9.88955	0.1764	0.38580	1.30745
29	9.80502	0.3921	1.16241	1.11266	14	9.89091	0.1607	0.32641	1.30833
30	9.80602	0.3928	1.15629	1.12150	15	9.89281	0.1426	0.25744	1.30909
May 1	+9.80675	-0.3916	-1.14996	-1.13004	16	+9.89522	-0.1255	-0.17532	-1.30973
2	9.80729	0.3879	1.14341	1.13828	17	9.89802	0.1125	0.07374	1.31025
3	9.80790	0.3814	1.13664	1.14624	18	9.90096	0.1057	9.94082	1.31065
4	9.80874	0.3720	1.12963	1.15394	19	9.90384	0.1054	9.74814	1.31093
5	9.81000	0.3602	1.12239	1.16137	h 20	9.90644	0.1107	-9.39300	1.31108
h 6	+9.81188	-0.3471	-1.11491	-1.16855	(18.0) 21	+9.90871	-0.1193	+8.81701	-1.31112
(15.0) 7	9.81438	0.3343	1.10718	1.17550	22	9.91054	0.1289	9.57789	1.31103
8	9.81741	0.3235	1.09918	1.18221	23	9.91202	0.1375	9.83943	1.31082
9	9.82077	0.3167	1.09090	1.18869	24	9.91318	0.1435	0.00142	1.31050
10	9.82412	0.3145	1.08235	1.19495	25	9.91414	0.1458	0.11901	1.31005
11	+9.82713	-0.3164	-1.07350	-1.20100	26	+9.91501	-0.1436	+0.21136	-1.30948
12	9.82953	0.3208	1.06434	1.20684	27	9.91595	0.1371	0.28735	1.30879
13	9.83128	0.3252	1.05486	1.21248	28	9.91712	0.1264	0.35190	1.30798
14	9.83237	0.3272	1.04505	1.21793	29	9.91868	0.1125	0.40796	1.30705
15	9.83307	0.3251	1.03489	1.22318	30	9.92068	0.0975	0.45750	1.30600
16	+9.83374	-0.3179	-1.02437	-1.22825	July 1	+9.92315	-0.0845	+0.50185	-1.30482
17	+9.83469	-0.3062	-1.01346	-1.23314	2	+9.92600	-0.0766	+0.54198	-1.30352



FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
July 1	+9.92315	-0.0845	+0.50185	-1.30482	Aug. 16	+9.99504	-0.2033	+1.18005	-1.08331
2	9.92600	0.0766	0.54198	1.30352	17	9.99566	0.2141	1.18531	1.07319
3	9.92898	0.0764	0.57860	1.30209	18	9.99605	0.2219	1.19039	1.06271
4	9.93190	0.0840	0.61226	1.30054	19	9.99630	0.2261	1.19529	1.05184
h 5	9.93448	0.0978	0.64338	1.29886	h 20	9.99654	0.2266	1.20002	1.04056
(19.0) 6	+9.93652	-0.1140	+0.67231	-1.29706	(20.0) 21	+9.99685	-0.2233	+1.20458	-1.02885
7	9.93800	0.1287	0.69932	1.29512	22	9.99738	0.2169	1.20897	1.01668
8	9.93902	0.1384	0.72464	1.29306	23	9.99822	0.2085	1.21319	1.00403
9	9.93976	0.1412	0.74846	1.29087	24	9.99944	0.2002	1.21726	0.99087
10	9.94053	0.1365	0.77092	1.28854	25	0.00102	0.1942	1.22116	0.97716
11	+9.94154	-0.1259	+0.79217	-1.28608	26	+0.00283	-0.1925	+1.22491	-0.96288
12	9.94298	0.1116	0.81231	1.28349	27	0.00473	0.1965	1.22851	0.94798
13	9.94487	0.0974	0.83146	1.28076	28	0.00652	0.2059	1.23196	0.93241
14	9.94714	0.0870	0.84967	1.27789	29	0.00799	0.2187	1.23525	0.91613
15	9.94962	0.0830	0.86705	1.27487	30	0.00904	0.2324	1.23840	0.89908
16	+9.95209	-0.0857	+0.88364	-1.27172	31	+0.00963	-0.2436	+1.24141	-0.88120
17	9.95436	0.0947	0.89951	1.26842	Sept. 1	0.00992	0.2502	1.24428	0.86241
18	9.95633	0.1077	0.91470	1.26497	2	0.01004	0.2510	1.24700	0.84263
19	9.95792	0.1220	0.92926	1.26138	3	0.01026	0.2461	1.24958	0.82177
20	9.95917	0.1357	0.94324	1.25763	h 4	0.01075	0.2367	1.25203	0.79971
h 21	+9.96011	-0.1467	+0.95667	-1.25372	(20.0) 5	+0.01162	-0.2253	+1.25434	-0.77632
(20.0) 22	9.96083	0.1542	0.96958	1.24966	6	0.01287	0.2149	1.25652	0.75146
23	9.96142	0.1575	0.98200	1.24544	7	0.01438	0.2077	1.25857	0.72494
24	9.96203	0.1563	0.99396	1.24106	8	0.01600	0.2055	1.26048	0.69654
25	9.96278	0.1510	1.00548	1.23650	9	0.01755	0.2084	1.26225	0.66800
26	+9.96382	-0.1425	+1.01658	-1.23178	10	+0.01888	-0.2154	+1.26390	-0.63299
27	9.96522	0.1324	1.02730	1.22688	11	0.01992	0.2245	1.26542	0.59711
28	9.96704	0.1234	1.03764	1.22180	12	0.02064	0.2338	1.26681	0.55784
29	9.96922	0.1181	1.04762	1.21654	13	0.02107	0.2417	1.26807	0.51449
30	9.97165	0.1190	1.05726	1.21109	14	0.02128	0.2471	1.26920	0.46616
31	+9.97406	-0.1270	+1.06658	-1.20545	15	+0.02133	-0.2492	+1.27020	-0.41160
Aug. 1	9.97625	0.1409	1.07558	1.19961	16	0.02135	0.2475	1.27108	0.34900
2	9.97802	0.1580	1.08428	1.19357	17	0.02142	0.2424	1.27183	0.27564
3	9.97932	0.1745	1.09270	1.18731	18	0.02167	0.2338	1.27245	0.18711
4	9.98013	0.1873	1.10084	1.18085	h 19	0.02219	0.2228	1.27294	0.07557
h 5	+9.98064	-0.1943	+1.10872	-1.17415	(0.0) 20	+0.02304	-0.2110	+1.27331	-9.92482
(21.0) 6	9.98105	0.1946	1.11633	1.16723	21	0.02423	0.2004	1.27356	9.69163
7	9.98162	0.1889	1.12370	1.16007	22	0.02571	0.1932	1.27367	-9.15193
8	9.98253	0.1791	1.13083	1.15266	23	0.02733	0.1912	1.27366	+9.31820
9	9.98386	0.1685	1.13773	1.14499	24	0.02890	0.1949	1.27352	9.74674
10	+9.98555	-0.1600	+1.14440	-1.13706	25	+0.03025	-0.2028	+1.27325	+9.95818
11	9.98747	0.1562	1.15085	1.12886	26	0.03124	0.2126	1.27286	0.09974
12	9.98944	0.1583	1.15710	1.12037	27	0.03181	0.2212	1.27234	0.20627
13	9.99128	0.1659	1.16313	1.11158	28	0.03204	0.2258	1.27169	0.29169
14	9.99286	0.1774	1.16897	1.10249	29	0.03209	0.2246	1.27091	0.36296
15	+9.99412	-0.1905	+1.17461	-1.09307	30	+0.03218	-0.2170	+1.27000	+0.42408
16	+9.99504	-0.2033	+1.18005	-1.08331	Oct. 1	+0.03250	-0.2039	+1.26896	+0.47758

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Oct. 1	+0.03250	-0.2039	+1.26896	+0.47758	Nov. 16	+0.07578	-9.5670	+1.03976	+1.22071
2	0.03316	0.1873	1.26778	0.52511	17	0.07765	9.5439	1.02892	1.22611
3	0.03423	0.1702	1.26648	0.56786	18	0.07941	9.5444	1.01765	1.23131
4	0.03560	0.1556	1.26504	0.60668	h 19	0.08095	9.5629	1.00594	1.23631
h 5	0.03715	0.1460	1.26347	0.64222	(4.0) 20	0.08211	9.5860	0.99377	1.24113
(1.0) 6	+0.03868	-0.1423	+1.26176	+0.67497	21	+0.08293	-9.6005	+0.98110	+1.24576
7	0.04005	0.1438	1.25991	0.70533	22	0.08349	9.5969	0.96790	1.25021
8	0.04115	0.1488	1.25793	0.73359	23	0.08395	9.5679	0.95415	1.25448
9	0.04196	0.1547	1.25580	0.76002	24	0.08451	9.5068	0.93981	1.25858
10	0.04248	0.1598	1.25354	0.78483	25	0.08534	9.4094	0.92483	1.26250
11	+0.04278	-0.1622	+1.25112	+0.80819	26	+0.08652	-9.2688	+0.90917	+1.26626
12	0.04292	0.1610	1.24857	0.83025	27	0.08806	9.0785	0.89278	1.26986
13	0.04301	0.1552	1.24586	0.85113	28	0.08986	8.8357	0.87559	1.27329
14	0.04313	0.1448	1.24301	0.87094	29	0.09178	8.5705	0.85755	1.27656
15	0.04340	0.1300	1.24000	0.88977	30	0.09364	8.4200	0.83859	1.27967
16	+0.04392	-0.1113	+1.23685	+0.90770	Dec. 1	+0.09532	-8.5079	+0.81860	+1.28262
17	0.04474	0.0904	1.23353	0.92481	2	0.09672	8.6739	0.79750	1.28542
18	0.04588	0.0695	1.23006	0.94115	3	0.09786	8.8089	0.77517	1.28807
19	0.04734	0.0519	1.22642	0.95678	4	0.09875	8.8837	0.75148	1.29057
h 20	0.04897	0.0404	1.22262	0.97175	h 5	0.09947	8.8998	0.72627	1.29292
(2.0) 21	+0.05063	-0.0367	+1.21865	+0.98610	(5.0) 6	+0.10007	-8.8451	+0.69935	+1.29512
22	0.05212	0.0402	1.21451	0.99987	7	0.10066	8.6712	0.67049	1.29718
23	0.05330	0.0479	1.21020	1.01309	8	0.10132	-8.0334	0.63942	1.29909
24	0.05410	0.0558	1.20571	1.02581	9	0.10214	+8.5515	0.60580	1.30086
25	0.05457	0.0592	1.20103	1.03804	10	0.10321	8.9455	0.56919	1.30248
26	+0.05481	-0.0552	+1.19617	+1.04981	11	+0.10455	+9.1495	+0.52905	+1.30396
27	0.05503	0.0416	1.19112	1.06114	12	0.10615	9.2725	0.48466	1.30530
28	0.05542	0.0187	1.18588	1.07207	13	0.10799	9.3408	0.43504	1.30650
29	0.05614	9.9884	1.18043	1.08260	14	0.10994	9.3653	0.37884	1.30756
30	0.05725	9.9543	1.17478	1.09277	15	0.11183	9.3506	0.31410	1.30849
31	+0.05871	-9.9216	+1.16891	+1.10257	16	+0.11353	+9.2997	+0.23782	+1.30927
Nov. 1	0.06038	9.8952	1.16283	1.11203	17	0.11491	9.2196	0.14504	1.30991
2	0.06213	9.8786	1.15652	1.12117	18	0.11597	9.1291	0.02671	1.31042
3	0.06376	9.8725	1.14999	1.13000	19	0.11672	9.0660	9.86332	1.31079
h 4	0.06516	9.8743	1.14321	1.13852	h 20	0.11730	9.0734	9.59804	1.31102
(3.0) 5	+0.06629	-9.8798	+1.13619	+1.14675	(6.0) 21	+0.11789	+9.1569	+8.79619	+1.31112
6	0.06712	9.8849	1.12891	1.15470	22	0.11869	9.2728	-9.43348	1.31107
7	0.06772	9.8861	1.12136	1.16239	23	0.11977	9.3820	9.78184	1.31089
8	0.06817	9.8810	1.11355	1.16981	24	0.12118	9.4669	9.97253	1.31058
9	0.06853	9.8681	1.10545	1.17698	25	0.12286	9.5224	0.10450	1.31012
10	+0.06892	-9.8460	+1.09705	+1.18391	26	+0.12469	+9.5483	-0.20546	+1.30953
11	0.06942	9.8142	1.08835	1.19060	27	0.12653	9.5479	0.28721	1.30880
12	0.07013	9.7722	1.07933	1.19706	28	0.12821	9.5240	0.35587	1.30792
13	0.07111	9.7215	1.06998	1.20329	29	0.12966	9.4817	0.41503	1.30691
14	0.07240	9.6654	1.06028	1.20931	30	0.13086	9.4278	0.46696	1.30576
15	+0.07398	-9.6108	+1.05021	+1.21511	31	+0.13179	+9.3707	-0.51322	+1.30447
16	+0.07578	-9.5670	+1.03976	+1.22071	32	+0.13252	+9.3232	-0.55491	+1.30304

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)		<i>r</i>	<i>f</i>	<i>f'</i>	<i>G</i>		<i>H</i>		Log <i>g</i> .	Log <i>h</i> .	<i>i</i>	Log <i>i</i> .
			In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
		<i>y</i>	<i>s</i>	<i>s</i>	<i>°</i> <i>'</i>	<i>h</i> <i>m</i>	<i>°</i> <i>'</i>	<i>h</i> <i>m</i>				
Jan.	0	0.0008	+1.009	-0.005	336 40.8	22 26.7	350 34.9	23 22.3	0.85244	1.31003	-1.45	-0.1612
	1	0.0035	1.021	0.008	337 9.0	22 28.6	349 38.5	23 18.6	0.85427	1.30980	1.59	0.2019
	2	0.0063	1.032	0.009	337 41.4	22 30.8	348 42.0	23 14.8	0.85704	1.30955	1.73	0.2390
	3	0.0090	1.044	0.008	338 15.2	22 33.0	347 45.5	23 11.0	0.86093	1.30929	1.88	0.2730
	4	0.0117	1.055	-0.004	338 44.7	22 35.0	346 48.9	23 7.3	0.86583	1.30900	2.02	0.3044
	5	0.0145	+1.067	+0.001	339 6.9	22 36.5	345 52.2	23 3.5	0.87140	1.30869	-2.16	-0.3336
	6	0.0172	1.078	0.006	339 20 3	22 37.4	344 55.4	22 59.7	0.87725	1.30837	2.30	0.3608
	7	0.0199	1.089	0.010	339 25.6	22 37.7	343 58.6	22 55.9	0.88299	1.30803	2.43	0.3863
	8	0.0227	1.100	0.012	339 24.2	22 37.6	343 1.7	22 52.1	0.88828	1.30766	2.57	0.4102
	9	0.0254	1.111	0.012	339 18.5	22 37.2	342 4.7	22 48.3	0.89286	1.30728	2.71	0.4327
	10	0.0282	+1.122	+0.010	339 11.0	22 36.7	341 7.5	22 44.5	0.89673	1.30688	-2.85	-0.4540
	11	0.0309	1.133	+0.006	339 4.0	22 36.3	340 10.3	22 40.7	0.89978	1.30646	2.98	0.4742
	12	0.0336	1.144	0.000	338 59.7	22 36.0	339 13.0	22 36.9	0.90206	1.30603	3.11	0.4933
	13	0.0364	1.155	-0.006	339 0.9	22 36.1	338 15.5	22 33.0	0.90382	1.30558	3.25	0.5115
	14	0.0391	1.166	0.011	339 8.7	22 36.6	337 18.0	22 29.2	0.90532	1.30512	3.38	0.5289
Feb.	15	0.0419	+1.177	-0.016	339 23.6	22 37.6	336 20.3	22 25.4	0.90689	1.30464	-3.51	-0.5454
	16	0.0446	1.187	0.018	339 44.5	22 39.0	335 22.4	22 21.5	0.90907	1.30414	3.64	0.5612
	17	0.0473	1.198	0.017	340 9.9	22 40.7	334 24.5	22 17.6	0.91211	1.30362	3.77	0.5763
	18	0.0501	1.208	0.013	340 34.4	22 42.3	333 26.4	22 13.8	0.91629	1.30310	3.90	0.5908
	19	0.0528	1.219	-0.007	340 54.4	22 43.6	332 28.2	22 9.9	0.92151	1.30256	4.02	0.6047
	20	0.0555	+1.229	+0.001	341 6.1	22 44.4	331 29.9	22 6.0	0.92741	1.30201	-4.15	-0.6180
	21	0.0583	1.239	0.008	341 8.3	22 44.6	330 31.4	22 2.1	0.93344	1.30144	4.27	0.6308
	22	0.0610	1.249	0.013	341 1.8	22 44.1	329 32.7	21 58.2	0.93897	1.30087	4.40	0.6430
	23	0.0638	1.259	0.015	340 49.6	22 43.3	328 33.9	21 54.3	0.94362	1.30028	4.52	0.6548
	24	0.0665	1.269	0.013	340 36.1	22 42.4	327 35.0	21 50.3	0.94705	1.29968	4.64	0.6662
	25	0.0692	+1.279	+0.009	340 26.0	22 41.7	326 35.9	21 46.4	0.94934	1.29907	-4.75	-0.6771
	26	0.0720	1.289	+0.003	340 22.8	22 41.5	325 36.7	21 42.5	0.95079	1.29846	4.87	0.6876
	27	0.0747	1.299	-0.003	340 27.9	22 41.9	324 37.3	21 38.5	0.95186	1.29783	4.99	0.6978
	28	0.0774	1.308	0.007	340 41.1	22 42.7	323 37.8	21 34.5	0.95303	1.29721	5.10	0.7075
	29	0.0802	1.318	0.009	340 59.5	22 44.0	322 38.1	21 30.5	0.95479	1.29657	5.21	0.7170
Feb.	30	0.0829	+1.327	-0.008	341 20.0	22 45.3	321 38.3	21 26.6	0.95738	1.29592	-5.32	-0.7260
	31	0.0856	1.336	-0.004	341 38.0	22 46.5	320 38.2	21 22.6	0.96075	1.29528	5.43	0.7348
	1	0.0884	1.345	0.000	341 50.7	22 47.4	319 38.0	21 18.5	0.96472	1.29463	5.54	0.7432
	2	0.0911	1.354	+0.005	341 57.0	22 47.8	318 37.8	21 14.5	0.96897	1.29396	5.64	0.7514
	3	0.0939	1.363	0.009	341 56.4	22 47.8	317 37.3	21 10.5	0.97313	1.29331	5.74	0.7592
	4	0.0966	+1.372	+0.012	341 50.7	22 47.4	316 36.6	21 6.4	0.97702	1.29265	-5.84	-0.7668
	5	0.0993	1.381	0.013	341 41.1	22 46.7	315 35.9	21 2.4	0.98036	1.29198	5.94	0.7742
	6	0.1021	1.390	0.011	341 29.8	22 46.0	314 34.9	20 58.3	0.98304	1.29132	6.04	0.7812
	7	0.1048	1.398	0.008	341 19.0	22 45.3	313 33.8	20 54.3	0.98511	1.29067	6.14	0.7880
	8	0.1076	1.407	+0.003	341 10.5	22 44.7	312 32.5	20 50.2	0.98656	1.29000	6.23	0.7946
	9	0.1103	+1.415	-0.003	341 5.9	22 44.4	311 31.0	20 46.1	0.98750	1.28934	-6.32	-0.8010
	10	0.1130	1.423	0.009	341 6.6	22 44.4	310 29.4	20 42.0	0.98817	1.28869	6.41	0.8071
	11	0.1158	1.431	0.014	341 13.3	22 44.9	309 27.6	20 37.8	0.98879	1.28804	6.50	0.8130
	12	0.1185	1.439	0.017	341 25.7	22 45.7	308 25.6	20 33.7	0.98975	1.28738	6.59	0.8186
	13	0.1212	1.447	0.018	341 42.1	22 46.8	307 23.5	20 29.6	0.99138	1.28674	6.67	0.8241
	14	0.1240	+1.455	-0.015	341 59.4	22 48.0	306 21.2	20 25.4	0.99386	1.28611	-6.75	-0.8294
	15	0.1267	+1.463	-0.010	342 14.1	22 48.9	305 18.8	20 21.3	0.99722	1.28549	-6.83	-0.8344

FOR

MEAN MIDNIGHT.

Log  $\lambda$ .

-0.8344  
 0.8393  
 0.8440  
 0.8485  
 0.8528  
 -0.8570  
 0.8610  
 0.8648  
 0.8684  
 0.8718  
 -0.8751  
 0.8783  
 0.8813  
 0.8841  
 0.8868  
 -0.8893  
 0.8917  
 0.8940  
 0.8961  
 0.8980  
 -0.8998  
 0.9015  
 0.9030  
 0.9044  
 0.9057  
 -0.9068  
 0.9078  
 0.9086  
 0.9093  
 0.9099  
 -0.9104  
 0.9107  
 0.9109  
 0.9110  
 0.9109  
 -0.9107  
 0.9104  
 0.9099  
 0.9093  
 0.9086  
 -0.9077  
 0.9067  
 0.9056  
 0.9044  
 0.9030  
 -0.9015  
 -0.8998

208

INDEPENDENT STAR-NUMBERS, 1917.

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)		$\tau$	$f$	$f'$	$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
			In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
		y	s	s	° '	h m	° '	h m			"	
Apr.	1	0.2499	+1.755	+0.013	345 7.7	23 0.5	257 3.8	17 8.3	1.07618	1.27541	-7.97	-0.9015
	2	0.2527	1.761	0.011	345 4.3	23 0.3	255 59.9	17 4.0	1.07727	1.27570	7.94	0.8999
	3	0.2554	1.768	0.007	345 2.3	23 0.2	254 56.2	16 59.7	1.07789	1.27601	7.91	0.8981
	4	0.2581	1.774	+0.002	345 3.0	23 0.2	253 52.5	16 55.5	1.07812	1.27635	7.87	0.8962
h	5	0.2609	1.780	-0.004	345 7.8	23 0.5	252 49.0	16 51.3	1.07811	1.27670	7.84	0.8941
(13.0)	6	0.2636	+1.787	-0.010	345 17.4	23 1.2	251 45.7	16 47.0	1.07801	1.27707	-7.80	-0.8919
	7	0.2664	1.793	0.014	345 31.8	23 2.1	250 42.5	16 42.8	1.07806	1.27747	7.76	0.8896
	8	0.2691	1.800	0.016	345 50.1	23 3.3	249 39.5	16 38.6	1.07855	1.27788	7.71	0.8872
	9	0.2718	1.806	0.015	346 10.5	23 4.7	248 36.6	16 34.4	1.07967	1.27830	7.67	0.8846
	10	0.2746	1.813	0.012	346 30.5	23 6.0	247 33.8	16 30.3	1.08152	1.27875	7.62	0.8818
	11	0.2773	+1.820	-0.006	346 47.2	23 7.1	246 31.3	16 26.1	1.08402	1.27920	-7.57	-0.8789
	12	0.2801	1.826	+0.001	346 58.5	23 7.9	245 28.9	16 21.9	1.08696	1.27968	7.51	0.8759
	13	0.2828	1.833	0.007	347 3.5	23 8.2	244 26.7	16 17.8	1.08992	1.28017	7.46	0.8727
	14	0.2855	1.840	0.011	347 3.0	23 8.2	243 24.6	16 13.6	1.09258	1.28068	7.40	0.8694
	15	0.2883	1.847	0.013	346 59.3	23 8.0	242 22.7	16 9.5	1.09463	1.28120	7.34	0.8659
	16	0.2910	+1.854	+0.011	346 55.4	23 7.7	241 21.0	16 5.4	1.09594	1.28173	-7.28	-0.8623
	17	0.2937	1.861	+0.006	346 54.7	23 7.6	240 19.5	16 1.3	1.09653	1.28228	7.22	0.8585
	18	0.2965	1.868	0.000	346 59.5	23 8.0	239 18.2	15 57.2	1.09665	1.28283	7.15	0.8545
	19	0.2992	1.875	-0.005	347 11.1	23 8.7	238 17.0	15 53.1	1.09670	1.28339	7.09	0.8504
h	20	0.3020	1.883	0.009	347 28.5	23 9.9	237 16.0	15 49.1	1.09700	1.28397	7.02	0.8461
(14.0)	21	0.3047	+1.890	-0.011	347 49.8	23 11.3	236 15.2	15 45.0	1.09784	1.28456	-6.95	-0.8417
	22	0.3074	1.898	0.009	348 11.8	23 12.8	235 14.7	15 41.0	1.09938	1.28515	6.87	0.8371
	23	0.3102	1.905	-0.005	348 31.7	23 14.1	234 14.3	15 37.0	1.10152	1.28575	6.80	0.8323
	24	0.3129	1.913	0.000	348 47.4	23 15.2	233 14.2	15 32.9	1.10407	1.28636	6.72	0.8273
	25	0.3156	1.920	+0.006	348 58.0	23 15.9	232 14.2	15 28.9	1.10676	1.28698	6.64	0.8221
	26	0.3184	+1.928	+0.010	349 3.8	23 16.3	231 14.4	15 25.0	1.10935	1.28760	-6.56	-0.8168
	27	0.3211	1.936	0.013	349 5.9	23 16.4	230 14.9	15 21.0	1.11166	1.28822	6.48	0.8113
	28	0.3239	1.944	0.013	349 5.9	23 16.4	229 15.6	15 17.0	1.11354	1.28884	6.39	0.8056
	29	0.3266	1.952	0.012	349 5.3	23 16.4	228 16.5	15 13.1	1.11495	1.28947	6.30	0.7997
	30	0.3293	1.960	0.008	349 5.7	23 16.4	227 17.6	15 9.2	1.11595	1.29010	6.22	0.7936
May	1	0.3321	+1.968	+0.003	349 8.6	23 16.6	226 18.8	15 5.3	1.11660	1.29074	-6.13	-0.7872
	2	0.3348	1.977	-0.003	349 14.7	23 17.0	225 20.3	15 1.4	1.11700	1.29137	6.04	0.7807
	3	0.3375	1.985	0.008	349 25.0	23 17.7	224 22.0	14 57.5	1.11736	1.29201	5.94	0.7739
	4	0.3403	1.994	0.013	349 39.4	23 18.6	223 23.8	14 53.6	1.11786	1.29264	5.85	0.7669
	5	0.3430	2.002	0.016	349 57.4	23 19.8	222 25.9	14 49.7	1.11872	1.29327	5.75	0.7597
h	6	0.3458	+2.011	-0.016	350 17.5	23 21.2	221 28.2	14 45.9	1.12016	1.29389	-5.65	-0.7522
(15.0)	7	0.3485	2.019	0.013	350 37.3	23 22.5	220 30.7	14 42.0	1.12223	1.29453	5.55	0.7445
	8	0.3512	2.028	0.008	350 54.6	23 23.6	219 33.4	14 38.2	1.12491	1.29516	5.45	0.7365
	9	0.3540	2.037	-0.001	351 7.0	23 24.5	218 36.2	14 34.4	1.12802	1.29577	5.35	0.7282
	10	0.3567	2.046	+0.006	351 13.7	23 24.9	217 39.3	14 30.6	1.13124	1.29639	5.24	0.7196
	11	0.3595	+2.055	+0.011	351 15.0	23 25.0	216 42.5	14 26.8	1.13422	1.29699	-5.14	-0.7108
	12	0.3622	2.064	0.013	351 12.6	23 24.8	215 45.9	14 23.1	1.13667	1.29759	5.03	0.7016
	13	0.3649	2.073	0.013	351 9.5	23 24.6	214 49.4	14 19.3	1.13848	1.29818	4.92	0.6921
	14	0.3677	2.083	0.009	351 8.4	23 24.6	213 53.1	14 15.5	1.13959	1.29877	4.81	0.6823
	15	0.3704	2.092	+0.003	351 11.7	23 24.8	212 57.1	14 11.8	1.14023	1.29935	4.70	0.6722
	16	0.3731	+2.101	-0.004	351 21.1	23 25.4	212 1.2	14 8.1	1.14072	1.29992	-4.59	-0.6616
	17	0.3759	+2.111	-0.009	351 35.7	23 26.4	211 5.4	14 4.4	1.14139	1.30048	-4.47	-0.6507



FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	r	f		f'		G		H		Log g.	Log h.	i	Log i.
		In Time.	In Time.	In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
	y	s	s	°	'	h	m	°	'			"	
May 17	0.3759	+2.111	-0.009	351	35.7	23	26.4	211	5.4	1.14139	1.30048	-4.47	-0.6507
18	0.3786	2.121	0.011	351	54.0	23	27.6	210	9.8	1.14256	1.30104	4.36	0.6394
19	0.3814	2.130	0.010	352	14.0	23	28.9	209	14.4	1.14435	1.30158	4.24	0.6277
20	0.3841	2.140	0.007	352	32.0	23	30.1	208	19.1	1.14671	1.30211	4.13	0.6155
h 21	0.3868	2.150	-0.002	352	46.4	23	31.0	207	24.0	1.14949	1.30264	4.01	0.6029
(16.0) 22	0.3896	+2.160	+0.004	352	56.1	23	31.7	206	29.0	1.15248	1.30314	-3.89	-0.5897
23	0.3923	2.170	0.009	353	1.1	23	32.1	205	34.2	1.15536	1.30363	3.77	0.5760
24	0.3950	2.180	0.012	353	2.3	23	32.2	204	39.5	1.15799	1.30412	3.65	0.5618
25	0.3978	2.190	0.013	353	1.3	23	32.1	203	45.0	1.16026	1.30459	3.52	0.5469
26	0.4005	2.200	0.012	352	59.6	23	32.0	202	50.6	1.16207	1.30504	3.40	0.5314
27	0.4033	+2.210	+0.009	352	58.5	23	31.9	201	56.4	1.16348	1.30549	-3.28	-0.5152
28	0.4060	2.220	+0.004	352	59.2	23	32.0	201	2.2	1.16458	1.30592	3.15	0.4983
29	0.4087	2.231	-0.001	353	2.6	23	32.2	200	8.2	1.16541	1.30633	3.02	0.4805
30	0.4115	2.241	0.007	353	9.5	23	32.6	199	14.3	1.16622	1.30673	2.90	0.4619
31	0.4142	2.252	0.012	353	19.9	23	33.3	198	20.5	1.16714	1.30710	2.77	0.4423
June 1	0.4169	+2.262	-0.015	353	33.3	23	34.2	197	26.9	1.16831	1.30748	-2.64	-0.4217
2	0.4197	2.273	0.016	353	48.8	23	35.3	196	33.4	1.16995	1.30783	2.51	0.3999
3	0.4224	2.283	0.015	354	4.2	23	36.3	195	39.9	1.17215	1.30816	2.38	0.3768
4	0.4252	2.294	0.010	354	17.7	23	37.2	194	46.6	1.17490	1.30848	2.25	0.3524
h 5	0.4279	2.305	-0.003	354	27.3	23	37.7	193	53.3	1.17805	1.30879	2.12	0.3263
(17.0) 6	0.4306	+2.316	+0.004	354	32.0	23	38.1	193	0.1	1.18135	1.30906	-1.99	-0.2984
7	0.4334	2.326	0.010	354	31.5	23	38.0	192	7.0	1.18451	1.30932	1.86	0.2686
8	0.4361	2.337	0.014	354	27.4	23	37.8	191	14.0	1.18726	1.30957	1.72	0.2365
9	0.4388	2.348	0.014	354	21.7	23	37.4	190	21.1	1.18940	1.30980	1.59	0.2016
10	0.4416	2.359	0.011	354	17.2	23	37.1	189	28.2	1.19090	1.31002	1.46	0.1635
11	0.4443	+2.370	+0.006	354	16.2	23	37.1	188	35.3	1.19193	1.31021	-1.32	-0.1217
12	0.4471	2.381	-0.001	354	20.1	23	37.3	187	42.5	1.19270	1.31038	1.19	0.0752
13	0.4498	2.392	0.006	354	29.0	23	37.9	186	49.8	1.19358	1.31055	1.06	0.0231
14	0.4525	2.403	0.010	354	41.7	23	38.8	185	57.1	1.19478	1.31068	0.92	9.9637
15	0.4553	2.414	0.010	354	56.0	23	39.7	185	4.4	1.19652	1.31079	0.78	9.8947
16	0.4580	+2.425	-0.008	355	9.3	23	40.6	184	11.8	1.19879	1.31090	-0.65	-9.8126
17	0.4608	2.436	-0.003	355	19.6	23	41.3	183	19.2	1.20147	1.31098	0.51	9.7110
18	0.4635	2.447	+0.002	355	25.8	23	41.7	182	26.6	1.20435	1.31105	0.38	9.5781
19	0.4662	2.458	0.007	355	27.8	23	41.9	181	34.1	1.20721	1.31109	0.24	9.3854
h 20	0.4690	2.469	0.011	355	25.9	23	41.7	180	41.5	1.20983	1.31111	-0.11	-9.0303
(18.0) 21	0.4717	+2.480	+0.013	355	22.1	23	41.5	179	49.0	1.21214	1.31112	+0.03	+8.4543
22	0.4744	2.491	0.013	355	17.1	23	41.1	178	56.5	1.21402	1.31111	0.16	9.2152
23	0.4772	2.502	0.010	355	12.5	23	40.8	178	3.9	1.21556	1.31107	0.30	9.4767
24	0.4799	2.513	+0.006	355	9.2	23	40.6	177	11.4	1.21675	1.31102	0.44	9.6387
25	0.4827	2.524	0.000	355	8.4	23	40.6	176	18.9	1.21772	1.31096	0.57	9.7563
26	0.4854	+2.535	-0.006	355	10.4	23	40.7	175	26.3	1.21857	1.31086	+0.71	+9.8486
27	0.4881	2.546	0.011	355	15.3	23	41.0	174	33.8	1.21945	1.31075	0.84	9.9246
28	0.4909	2.557	0.015	355	22.9	23	41.5	173	41.2	1.22054	1.31062	0.98	9.9892
29	0.4936	2.568	0.017	355	32.6	23	42.2	172	48.6	1.22200	1.31048	1.11	0.0452
30	0.4963	2.579	0.016	355	42.8	23	42.9	171	55.9	1.22390	1.31032	1.24	0.0948
July 1	0.4991	+2.590	-0.012	355	51.7	23	43.4	171	3.3	1.22629	1.31013	+1.38	+0.1391
2	0.5018	+2.600	-0.006	355	57.8	23	43.9	170	10.6	1.22909	1.30994	+1.51	+0.1793



FOR ~~XXXX~~ MEAN MIDNIGHT.





## FOR WASHINGTON MEAN

Solar Day (Sidereal Hour.)	r	f		G	
		In Time.	In Time.	In Arc.	In Time.
	y	s	s	° ' "	h m
Nov. 16	0.8760	+3.665	-0.004	359 6.9	23 56.
17	0.8797	3.674	+0.003	359 9.8	23 56.
18	0.8824	3.684	0.000	359 10.0	23 56.
h 19	0.8851	3.693	0.011	359 8.0	23 56.
(4.0) 20	0.8879	3.703	0.011	359 5.3	23 56.
21	0.8906	+3.713	+0.008	359 3.5	23 56.
22	0.8933	3.723	+0.003	359 4.1	23 56.
23	0.8961	3.733	-0.003	359 7.7	23 56.
24	0.8988	3.743	0.008	359 14.7	23 57.
25	0.9016	3.753	0.011	359 23.8	23 57.
26	0.9043	+3.764	-0.011	359 33.9	23 58.
27	0.9070	3.774	0.008	359 43.2	23 58.
28	0.9097	3.785	-0.003	359 50.4	23 59.
29	0.9125	3.795	+0.003	359 54.8	23 59.
30	0.9152	3.806	0.009	359 56.4	23 59.
Dec. 1	0.9180	+3.816	+0.013	359 55.6	23 59.
2	0.9207	3.827	0.015	359 53.5	23 59.
3	0.9235	3.838	0.014	359 51.2	23 59.
4	0.9262	3.849	0.011	359 49.5	23 59.
h 5	0.9289	3.860	0.007	359 49.2	23 59.
(5.0) 6	0.9317	+3.871	+0.001	359 50.5	23 59.
7	0.9344	3.882	-0.005	359 53.5	23 59.
8	0.9371	3.893	0.010	359 58.5	23 59.
9	0.9399	3.904	0.014	0 4.8	0 0.
10	0.9426	3.915	0.015	0 11.9	0 0.
11	0.9454	+3.926	-0.014	0 19.0	0 1.
12	0.9481	3.937	0.011	0 25.2	0 1.
13	0.9508	3.948	-0.006	0 29.3	0 2.
14	0.9536	3.959	+0.001	0 30.9	0 2.
15	0.9563	3.971	0.007	0 29.7	0 2.
16	0.9591	+3.982	+0.011	0 26.3	0 1.
17	0.9618	3.994	0.012	0 21.8	0 1.
18	0.9645	4.005	0.011	0 17.7	0 1.
19	0.9673	4.016	+0.006	0 15.3	0 1.
20	0.9700	4.028	0.000	0 15.5	0 1.
h (5.0) 21	0.9727	+4.039	-0.006	0 18.8	0 1.
22	0.9755	4.051	0.010	0 24.5	0 1.
23	0.9782	4.062	0.011	0 31.4	0 2.
24	0.9810	4.073	0.000	0 38.0	0 2.
25	0.9837	4.085	-0.005	0 43.0	0 2.
26	0.9864	+4.096	+0.001	0 45.5	0 3.
27	0.9892	4.108	0.007	0 45.3	0 3.
28	0.9919	4.119	0.012	0 42.7	0 2.
29	0.9946	4.130	0.014	0 38.6	0 2.
30	0.9974	4.142	0.014	0 34.0	0 2.
31	1.0001	+4.153	+0.012	0 29.7	0 2.
1.0029	+4.164	+0.008	0 26.6	0 1.	

214 BESSELIAN AND INDEPENDENT STAR-NUMBERS, 1917.

FOR WASHINGTON SIDEREAL TWELVE HOURS.

Mean Solar Date.	Log A <sub>1</sub> .	Log B <sub>1</sub> .	Log C.	Log D.	f	G <sub>1</sub>	H	Log ϑ <sub>1</sub> .	Log h.	Log i.
					s	° ′	° ′			
Jan. 0.72	+9.5166	-0.4382	-0.5332	+1.3038	+1.012	337 23	350 22	0.8534	1.3100	-0.1705
10.69	9.5625	0.4415	0.8208	1.2823	1.125	339 19	340 56	0.8934	1.3068	0.4580
20.67	9.6017	0.4529	0.9828	1.2451	1.231	340 30	331 20	0.9294	1.3019	0.6202
30.64	9.6348	0.4689	1.0900	1.1894	1.328	341 12	321 30	0.9606	1.2958	0.7273
Feb. 9.61	9.6627	0.4856	1.1644	1.1097	1.416	341 39	311 24	0.9874	1.2893	0.8017
19.58	+9.6860	-0.4998	-1.2159	+0.9953	+1.494	342 0	301 2	1.0098	1.2830	-0.8532
Mar. 1.56	9.7059	0.5086	1.2497	0.8209	1.564	342 26	290 26	1.0286	1.2779	0.8870
11.53	9.7232	0.5101	1.2684	+0.5006	1.627	343 1	279 41	1.0446	1.2746	0.9057
21.50	9.7391	0.5031	1.2736	-9.5615	1.688	343 50	268 53	1.0586	1.2737	0.9109
31.48	9.7545	0.4867	1.2658	0.5874	1.749	344 56	258 9	1.0717	1.2751	0.9030
Apr. 10.45	+9.7702	-0.4609	-1.2447	-0.8594	+1.812	346 15	247 37	1.0848	1.2787	-0.8819
20.42	9.7866	0.4257	1.2092	1.0160	1.882	347 44	237 21	1.0986	1.2839	0.8464
30.39	9.8040	0.3822	1.1570	1.1206	1.959	349 18	227 24	1.1136	1.2900	0.7943
May 10.37	9.8226	0.3317	1.0835	1.1941	2.045	350 51	217 47	1.1302	1.2963	0.7208
20.34	9.8421	0.2771	0.9802	1.2460	2.138	352 16	208 28	1.1481	1.3020	0.6175
30.31	+9.8621	-0.2223	-0.8282	-1.2813	+2.239	353 29	199 25	1.1669	1.3067	-0.4655
June 9.28	9.8823	0.1727	0.5722	1.3024	2.346	354 26	190 33	1.1864	1.3097	0.2095
19.26	9.9021	0.1343	-9.8035	1.3109	2.455	355 8	181 47	1.2057	1.3111	-9.4409
29.23	9.9211	0.1123	+0.3936	1.3073	2.565	355 34	173 3	1.2244	1.3105	+0.0309
July 9.20	9.9389	0.1087	0.7416	1.2915	2.672	355 47	164 16	1.2421	1.3081	0.3788
19.17	+9.9554	-0.1213	+0.9246	-1.2626	+2.775	355 49	155 20	1.2586	1.3041	+0.5618
29.15	9.9702	0.1451	1.0442	1.2184	2.872	355 44	146 12	1.2734	1.2988	0.6814
Aug. 8.12	9.9834	0.1734	1.1282	1.1555	2.959	355 35	136 48	1.2867	1.2928	0.7654
18.09	9.9950	0.2000	1.1884	1.0671	3.040	355 26	127 6	1.2984	1.2866	0.8257
28.07	0.0051	0.2202	1.2304	0.9393	3.112	355 19	117 6	1.3086	1.2809	0.8677
Sept. 7.04	+0.0142	-0.2300	+1.2577	-0.7374	+3.177	355 19	106 48	1.3177	1.2766	+0.8949
17.01	0.0224	0.2264	1.2714	-0.3131	3.238	355 26	96 17	1.3258	1.2741	0.9088
26.98	0.0302	0.2065	1.2726	+0.1547	3.297	355 43	85 39	1.3334	1.2739	0.9099
Oct. 6.96	0.0380	0.1671	1.2609	0.6891	3.357	356 9	75 0	1.3410	1.2760	0.8982
16.93	0.0462	0.1044	1.2355	0.9152	3.421	356 44	64 26	1.3489	1.2802	0.8727
26.90	+0.0551	-0.0117	+1.1942	+1.0544	+3.491	357 25	54 4	1.3575	1.2859	+0.8314
Nov. 5.87	0.0648	9.8779	1.1335	1.1498	3.570	358 9	43 56	1.3670	1.2923	0.7708
15.85	0.0755	9.6790	1.0466	1.2171	3.658	358 51	34 2	1.3776	1.2987	0.6839
25.82	0.0870	-9.3388	0.9199	1.2637	3.757	359 29	24 22	1.3890	1.3043	0.5572
Dec. 5.79	0.0991	+6.7782	0.7187	1.2936	3.863	0 0	14 54	1.4011	1.3084	0.3559
15.77	+0.1114	+9.2087	+0.2951	+1.3087	+3.974	0 21	5 32	1.4134	1.3107	+9.9324
25.74	0.1237	9.4072	-0.1308	1.3100	4.088	0 33	356 13	1.4257	1.3109	-9.7680
35.71	+0.1354	+9.4473	-0.6660	+1.2975	+4.200	0 35	346 51	1.4374	1.3090	-0.3034

E = +0.003

The above numbers give the same reductions from mean to apparent place as are employed in computing the apparent places of the fixed stars, given on pages 316 to 513, from the mean places, given on pages 217 to 230. In order to render exact interpolation possible through intervals of ten days, all short period terms have been omitted.

## TERMS OF SHORT PERIOD IN THE NUTATION, 1917. 215

**FOR W**

**MEAN MIDNIGHT.**

**216 TERMS OF SHORT PERIOD IN THE NUTATION, 1917.**

**FOR W**

**MEAN MIDNIGHT.**

# MEAN PLACES OF TEN-DAY STARS, 1917. 217

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

13 Ceti, dup. 5<sup>m</sup>.5, 6<sup>m</sup>.2, 0<sup>h</sup>.3  
 α Cassiop., var. irreg. 2<sup>m</sup>.2, 2<sup>m</sup>.8  
 η Cassiop. comp. 7<sup>m</sup>.6, 4<sup>h</sup>.2 s. pr.

β Phoenicis, dup. 4<sup>m</sup>.1, 4<sup>m</sup>.1, 1<sup>h</sup>.1  
 ζ Piscium, star 6<sup>m</sup>.5, 24<sup>h</sup>.1 n. f.

α Tucanæ, comp. 7<sup>m</sup>, 6<sup>h</sup>.2 n.  
 α Sculptoris, comp. 6<sup>m</sup>, 5<sup>h</sup>.2 n. f.

# 218 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

• Ceti, var., 331<sup>d</sup>, 1<sup>m</sup>.7-9<sup>m</sup>.6 star 9<sup>m</sup> 1.8<sup>m</sup>  
 † Cassio. p., triple, 7<sup>m</sup>, 8<sup>m</sup>, 2<sup>''</sup>, 8<sup>''</sup>  
 γ Ceti, comp. 6<sup>m</sup>.2, 2<sup>''</sup> 7 pr.

• Persei, star 8<sup>m</sup>.5, 28<sup>''</sup> n. pr.  
 † Arietis, dup., 5<sup>m</sup>.2, 5<sup>m</sup>.6, 1<sup>''</sup>.2  
 • Eridani, comp. 4<sup>m</sup>.4, 1.8<sup>''</sup>

• Persei, var. irreg., 3<sup>m</sup>.4-4<sup>m</sup>.2  
 † Persei, var. 2<sup>d</sup>.87, 2<sup>m</sup>.1-3<sup>m</sup>.2  
 12 Eridani, comp. 7<sup>m</sup>, 1<sup>''</sup>.4 n. pr.

# MEAN PLACES OF TEN-DAY STARS, 1917. 219

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

23 Horologii, remarkable purplish red  
star.  
e Eridani, comp. 9<sup>m</sup>, a. 7''

v Tauri, quad., comp. 6<sup>m</sup>.3, 7<sup>m</sup>.6,  
8<sup>m</sup>.2, 117'', 181'', 190''  
9 H. Camelop., comp. 8<sup>m</sup>, 1''.9 n. f.  
e Persei, comp. 8<sup>m</sup>, 8''.6 n. f.

λ Tauri, var., 3<sup>d</sup>.95, 3<sup>m</sup>.3-4<sup>m</sup>.2  
A Tauri, star 6<sup>m</sup>.5 f. 38°, 270' s.  
m Persei, star 6<sup>m</sup>, 115'' s. pr.  
e Aurigæ, var. irreg., 3<sup>m</sup>.0-4<sup>m</sup>.5



# 220 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

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β Orionis, comp. 8<sup>m</sup>.0, 9<sup>s</sup>.5 a. pr.  
 δ Orionis, star 6<sup>m</sup>.9, 52<sup>s</sup>.6 n.  
 ε Orionis, comp. 7<sup>m</sup>.2, 11<sup>s</sup>.5 a. f.

ζ Orionis, comp. 4<sup>m</sup>.2, 2<sup>s</sup>.4 a. f.  
 α Orionis red star, var. irreg. 1<sup>m</sup>.0-1<sup>m</sup>.4  
 θ Aurigæ, comp. 7<sup>m</sup>.5, 3<sup>s</sup>.5 n. pr.

1 Puppis, star, 5<sup>m</sup>.8, 150<sup>s</sup>. f.  
 η Gem., var. 231<sup>d</sup>.4, 3<sup>m</sup>.2-4<sup>m</sup>.2, comp.  
 8<sup>m</sup>.8, 1<sup>s</sup>.2 n. pr.  
 8 Monoc., star, 6<sup>m</sup>.5, 13<sup>s</sup>.7 n. f.

# MEAN PLACES OF TEN-DAY STARS, 1917. 221

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

8 Monoc., comp. 8<sup>m</sup>.8, 2<sup>s</sup>.9 a. pr.  
 15 Lyncis, dup., 4<sup>m</sup>.9, 6<sup>m</sup>.2, 0<sup>s</sup>.7  
 e Can. Maj., comp. 9<sup>m</sup>, 7<sup>s</sup>.8 a. f.  
 ζ Gem., var., 10<sup>d</sup>.15, 2<sup>m</sup>.7-4<sup>m</sup>.3

γ<sup>1</sup> Volantis, comp. 5<sup>m</sup>.8, 12<sup>s</sup>.9 n. pr.  
 δ Gem., comp. 8<sup>m</sup>, 7<sup>s</sup>.0 a. pr.  
 α Argus, star 8<sup>m</sup>, 22<sup>s</sup>.4 n. f.  
 α Gem., comp. 8<sup>m</sup>.5, 6<sup>s</sup>.6 a. pr.

γ Argus, star 5<sup>m</sup>, 42<sup>s</sup>.5 a. pr.  
 ζ Cancri, triple; binary 5<sup>m</sup>.6, 6<sup>m</sup>.3, 1<sup>s</sup>.  
 with comp. 6<sup>m</sup>.0, 5<sup>s</sup>.4 a. f.

Positions given for Sirius and Procyon are those of the centers of their orbits. Corrections given on page xii to be applied to reduce to the positions of the stars.

# 222 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

1 Canceri, star 6<sup>m</sup>.6, 30<sup>''</sup>.6 n. pr.  
 2 Hydre, triple; binary 3<sup>m</sup>.5, 6<sup>m</sup>.8,  
 0<sup>''</sup>.2, with comp. 7<sup>m</sup>.8, 3<sup>''</sup>.3  
 3 Argus, comp. 5<sup>m</sup>, 2<sup>''</sup> a.

4<sup>a</sup> Canceri, dup. 5<sup>m</sup>.9, 6<sup>m</sup>.4, 1<sup>''</sup>.4  
 b<sup>i</sup> Carinae, comp. 7<sup>m</sup>.2, 5<sup>m</sup> l  
 5<sup>a</sup> Ura. Maj., binary 4<sup>m</sup>.9, 8<sup>m</sup>, 1<sup>''</sup>.3

6 Argus, dup. 3<sup>m</sup>.8, 6<sup>m</sup>.0, 0<sup>''</sup>.8  
 7 Argus, comp. 6<sup>m</sup>.0, 4<sup>''</sup>.9 a. l.  
 8 Leonis, comp. 3<sup>m</sup>.8, 3<sup>''</sup>.7 a. l.

MEAN PLACES OF TEN-DAY STARS, 1917. 223

FOR JANUARY 0<sup>d</sup> 217, WASHINGTON MEAN TIME.

1	-	3	2	3	9	9	3	0	9	7	1	9	1	5	4	1	3	5	5	2	5	1	1	0	3	5	5	3	5	3	5	1	5	7	9	3	5	1	0	8	5	4	4	2	2	0	3	9	8	5	7	0
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♂ *Argus*, var., integ., 1=6-6=6  
 ♀ *Argus*, comp. 7=, 2' 2 n. f.

8<sup>2</sup> Cham., star 5<sup>m</sup>.5 pr. 32<sup>e</sup>, 256'' n.  
54 Leonis, comp. 6<sup>m</sup>.3, 6'' .4 n. f.

2 Can. Ven., star 8<sup>th</sup>, 11<sup>th</sup>.6 a. pr.

224 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spectro- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	"	"
β Chamæleontis . . .	4.4	B5	12 13 26.825	+3.4515	-.0188	-78 51 4.93	-19.994	+0.017
η Virginis . . .	4.0	A0	12 15 39.568	3.0694	-.0036	- 0 12 20.31	20.026	-0.027
α <sup>1</sup> Crucis . . .	1.6	B1	12 21 58.181	3.3134	-.0064	-62 38 21.43	19.993	-0.039
α <sup>2</sup> Crucis . . .	2.1		Δα + 0.628	...	...	Δδ - 1.87	...	...
20 Comæ . . .	5.7	A2	12 25 33.217	3.0181	+.0036	+21 21 20.18	19.957	-0.036
δ Corvi . . . †	3.1	A0	12 25 34.065	+3.1014	- 0140	-16 3 12.48	-20.069	-0.149
γ Crucis . . . †	1.6	Mb	12 26 33.028	3.3046	-.0028	-56 38 54.24	20.172	-0.261
8 Canum Venaticorum	4.3	G0	12 29 48.338	2.8560	-.0617	+41 48 29.82	19.597	+0.279
κ Draconis . . .	3.9	B5p	12 29 56.924	2.5766	-.0112	+70 14 44.25	19.864	+0.010
β Corvi . . .	2.8	G5	12 30 1.405	3.1458	-.0008	-22 56 16.40	19.935	-0.061
24 Comæ seq. . . †	5.2	K0	12 30 58.031	+3.0106	-.0007	+18 50 1.51	-19.850	+0.013
α Muscæ . . .	2.9	B3	12 32 13.073	3.5436	-.0088	-68 40 42.18	19.876	-0.029
χ Virginis . . .	4.8	K0	12 34 57.636	3.0939	-.0056	- 7 32 20.34	19.843	-0.031
γ Centauri . . . †	2.4	A0	12 36 55.952	3.2955	-.0196	-48 30 15.08	19.805	-0.020
γ Virginis (mean) . . †	2.9	F0	12 37 27.290	3.0399	-.0365	- 0 59 39.62	19.774	+0.004
ρ Virginis . . .	5.0	A0	12 37 41.049	+3.0372	+.0058	+10 41 33.89	-19.882	-0.107
76 Ursæ Majoris . . .	5.9	A0	12 37 56.652	2.6307	-.0065	+63 10 6.88	19.790	-0.018
β Crucis . . .	1.5	B1	12 42 51.646	3.4836	-.0064	-59 14 7.14	19.729	-0.033
31 Comæ . . .	5.1	G0	12 47 39.407	2.9238	-.0022	+27 59 31.52	19.638	-0.024
n Centauri . . .	4.3	A5	12 48 50.062	3.3135	+.0060	-39 43 39.77	19.626	-0.035
ε Ursæ Majoris (Alioth)	1.7	A0p	12 50 22.936	+2.6477	+.0138	+56 24 36.46	-19.576	-0.013
δ Virginis . . .	3.7	Ma	12 51 25.308	3.0209	-.0318	+ 3 50 53.79	19.603	-0.060
α Canum Venat. seq. . †	2.9	A0p	12 52 8.856	2.8103	-.0203	+38 45 58.99	19.480	+0.049
δ Muscæ . . .	3.6	K2	12 56 32.256	4.0755	+.0496	-71 6 5.16	19.470	-0.031
ε Virginis . . .	3.0	K0	12 58 2.714	2.9865	-.0186	+11 24 17.96	19.391	+0.015
θ Virginis . . . †	4.4	A0	13 5 39.035	+3.1034	-.0029	- 5 5 46.26	-19.269	-0.040
43 Comæ . . .	4.3	G0	13 8 0.119	2.8024	-.0599	+28 17 55.05	18.291	+0.879
20 Canum Venaticorum	4.7	F0	13 13 49.448	2.6954	-.0094	+41 0 33.61	18.999	+0.015
γ Hydræ . . .	3.3	G5	13 14 24.338	3.2559	+.0046	-22 44 2.20	19.051	-0.053
ι Centauri . . .	2.9	A2	13 15 55.465	3.3623	-.0294	-36 16 29.40	19.052	-0.097
ζ <sup>1</sup> Ursæ Maj. (Mizar) . †	2.4	A0p	13 20 35.249	+2.4218	+.0153	+55 21 30.68	-18.848	-0.080
ζ <sup>2</sup> Ursæ Majoris . . .	4.0	A0	Δα + 0.916	...	...	Δδ -12.40	...	...
α Virginis (Spica) . .	1.2	B2	13 20 49.090	3.1573	-.0028	-10 43 42.19	18.844	-0.032
Groombridge 2001 . .	6.1	K5	13 24 0.915	1.5244	+.0012	+72 49 19.90	18.732	-0.019
70 Virginis . . .	5.2	G5	13 24 22.227	2.9340	-.0168	+14 13 18.23	19.286	-0.584
ζ Virginis . . .	3.4	A2	13 30 27.735	+3.0546	-.0195	- 0 10 18.77	-18.465	+0.039
17 H. Canum Venaticorum	5.0	F0	13 31 5.572	2.6815	+.0073	+37 36 26.55	18.487	-0.004
ε Centauri . . .	2.6	B1	13 34 37.129	3.7814	-.0039	-53 2 41.91	18.400	-0.039
m Virginis . . .	5.2	Ma	13 37 15.201	3.1454	-.0073	- 8 17 4.56	18.235	+0.032
τ Boötis . . .	4.5	F5	13 43 19.071	2.8508	-.0341	+17 52 11.79	18.016	+0.026
η Ursæ Majoris (Alkaid)	1.9	B3	13 44 16.341	+2.3678	-.0118	+49 43 37.57	-18.029	-0.023
89 Virginis . . .	5.1	K0	13 45 21.487	3.2544	-.0077	-17 43 16.12	18.005	-0.040
ζ Centauri . . .	3.1	B2p	13 50 21.223	3.7266	-.0070	-46 52 49.39	17.830	-0.064
η Boötis . . .	2.8	G0	13 50 43.968	2.8567	-.0044	+18 48 47.97	18.114	-0.363
θ Apodis . . . †	var.	Mb	13 57 11.699	5.7459	-.0293	-76 23 48.82	17.510	-0.029
11 Boötis . . .	6.1	A3	13 57 24.729	+2.7215	-.0060	+27 47 13.03	-17.467	+0.005
τ Virginis . . .	4.3	A2	13 57 25.268	3.0514	+.0010	+ 1 56 44.56	17.500	-0.029
β Centauri . . .	0.9	B1	13 57 57.232	4.2075	-.0033	-59 58 23.52	17.482	-0.033
π Hydræ . . .	3.5	K0	14 1 38.444	3.4099	+.0031	-26 16 59.18	17.434	-0.146
θ Centauri . . .	2.3	K0	14 1 47.518	3.5203	-.0437	-35 57 43.84	17.806	-0.526
α Draconis . . .	3.6	A0	14 2 8.553	+1.6245	-.0071	+64 46 20.01	-17.254	+0.011
d Boötis . . .	4.8	F5	14 6 36.864	2.7370	-.0014	+25 29 3.30	17.141	-0.078
κ Virginis . . .	4.3	K0	14 8 27.955	+3.1971	+.0006	- 9 53 16.58	16.846	+0.132
4 Ursæ Minoris . . .	5.0	K0	14 9 9.051	-0.2786	-.0108	+77 56 14.88	16.920	+0.026
ι Virginis . . .	4.2	F5	14 11 39.592	+3.1426	-.0013	- 5 36 17.81	17.255	-0.427
α Boötis (Arcturus) . .	0.2	K0	14 11 52.501	+2.7356	-.0779	+19 36 50.39	-18.821	-2.003
λ Boötis . . .	4.3	A0	14 13 13.805	+2.2830	-.0172	+46 28 8.27	-16.602	+0.151

δ Corvi, star 8<sup>m</sup>, 24'' .4 s. pr.

γ Crucis, star 6<sup>m</sup>.6, 85'' n. f.

24 Comæ, star 6<sup>m</sup>.7, 20'' .6 pr.

γ Cent., dup., 3<sup>m</sup>1, 3<sup>m</sup>.1, 1'' .7

γ Virginis, binary, 3<sup>m</sup>.7, 3<sup>m</sup>.7, 6'' .2,

P=328°

α Can. Ven., star 5<sup>m</sup>, 19'' .8 s. pr.

θ Virginis, comp. 9<sup>m</sup>, 7'' .1 n. pr.

ζ<sup>1</sup> Urs. Maj., star Alcor 4<sup>m</sup>.0, f. 79<sup>m</sup>.2

222'' n.

θ Apodis, var. irreg., 5<sup>m</sup>.5-6<sup>m</sup>.6

FOR JANUARY 0<sup>h</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spect- rum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>"</sup>
$\lambda$ Virginis . . . . .	4.6	A2	14 14 36.912	+3.2411	-.0024	-12 59 22.71	-16.645	+0.021
2 Libræ . . . . .	6.3	K0	14 18 57.478	3.2240	-.0014	-11 20 7.90	16.539	-0.067
$\theta$ Boötis . . . . .	4.1	F8	14 22 22.329	2.0433	-.0254	+52 14 2.20	16.706	-0.406
$\gamma$ Boötis . . . . .	5.4	A5	14 22 35.703	2.7901	-.0052	+19 35 58.11	16.274	+0.015
$\phi$ Virginis . . . . .	5.0	K0	14 23 55.458	2.7091	-.0090	-1 51 23.14	16.225	-0.094
5 Ursæ Minoris . . . . .	4.4	K2	14 27 40.979	-0.1604	+0.0022	+76 3 54.14	-16.004	+0.021
$\rho$ Boötis . . . . .	3.8	K0	14 28 15.208	+2.5865	-.0073	+30 44 6.73	15.882	+0.113
$\gamma$ Boötis . . . . .	3.0	F0	14 28 44.200	2.4171	-.0091	+38 40 14.90	15.835	+0.145
$\eta$ Centauri . . . . .	2.6	B3p	14 30 13.824	3.7977	-.0032	-41 47 37.92	15.721	-0.082
$\sigma$ Boötis . . . . .	4.5	F0	14 31 4.036	2.6131	+0.0150	+30 6 18.60	15.721	+0.126
$\alpha$ Centauri . . . . .	0.1	<del>III</del>	14 33 57.052	+4.0561	-.4861	-60 29 36.71	-14.967	+0.723
33 Boötis . . . . .	5.4	A0	14 35 44.969	2.2341	-.0056	+44 45 43.53	15.635	-0.043
$\alpha$ Apodis . . . . .	3.8	K5	14 37 28.968	7.3038	-.0088	-78 41 37.47	15.520	-0.024
$\mu$ Virginis . . . . .	4.0	<del>III</del>	14 38 41.050	3.1588	+0.071	-5 17 52.80	15.761	-0.323
$\epsilon$ Boötis . . . . .	2.7	K0p	14 41 21.734	2.6203	-.0036	+27 25 24.57	15.289	+0.000
109 Virginis . . . . .	3.8	A0	14 42 3.086	+3.0313	-.0074	+2 14 31.17	-15.274	-0.035
8 Libræ . . . . .	5.3	F5	14 46 5.561	3.3136	-.0073	-15 39 10.04	15.061	-0.074
$\alpha$ Libræ . . . . .	2.9	A2	14 46 17.008	3.3141	-.0078	-15 41 51.20	15.073	-0.077
Groombridge 2164 . . . . .	5.7	K2	14 49 19.924	+1.5204	-.0166	+59 37 51.22	14.711	+0.118
$\beta$ Ursæ Minoris . . . . .	2.2	K5	14 50 56.060	-0.2026	-.0066	+74 29 40.81	14.721	+0.003
$\epsilon$ Libræ . . . . .	5.6	K0	14 52 15.680	+3.2507	-.0006	-11 4 31.52	-14.646	-0.001
Piazzi 221 . . . . .	5.8	A0	14 52 18.093	2.8296	-.0021	+14 46 51.83	14.863	-0.011
$\beta$ Lupi . . . . .	2.8	B2p	14 53 5.179	3.9129	-.0070	-42 48 2.05	14.721	-0.033
$\delta$ Libræ . . . . .	var.	A0	14 56 32.093	3.2015	-.0051	-8 11 25.13	14.402	-0.015
$\beta$ Boötis . . . . .	3.6	G5	14 58 49.182	2.2800	-.0036	+40 43 2.45	14.287	-0.040
$\gamma$ Scorpii . . . . .	3.4	Ma	14 59 12.512	+2.5052	-.0056	-24 57 23.19	-14.271	-0.049
$\phi$ Boötis . . . . .	4.7	K0	15 0 53.334	2.5704	-.0071	+27 16 14.23	14.133	-0.014
$\epsilon$ Boötis . . . . .	5.0	F0	15 3 39.326	2.6347	+0.0136	+25 11 30.10	14.131	-0.101
$\zeta$ Lupi . . . . .	3.5	K0	15 6 18.818	4.2928	-.0126	-51 47 2.64	13.834	-0.066
$\epsilon$ Libræ . . . . .	4.7	A0p	15 7 29.193	3.4145	-.0031	-19 28 42.58	13.767	-0.063
3 Serpentis . . . . .	5.4	K0	15 11 3.707	+2.9801	-.0017	+5 14 48.40	-13.478	-0.005
$\gamma$ Trianguli Australis . . . . .	3.1	A0	15 11 8.361	5.5554	-.0137	-68 22 27.17	13.310	-0.042
$\delta$ Boötis . . . . .	3.5	K0	15 12 9.406	2.4198	+0.0075	+33 37 25.59	13.528	-0.126
$\beta$ Libræ . . . . .	2.7	B1	15 12 32.293	+3.2251	-.0066	-9 4 38.73	13.310	-0.024
$\gamma$ Ursæ Minoris . . . . .	3.1	A2	15 20 51.060	-0.1143	-.0020	+72 7 45.49	13.310	+0.013
$\mu$ Boötis pr. . . . .	4.5	F0	15 21 21.295	+2.2664	-.0121	+37 40 3.51	-12.713	+0.081
$\epsilon$ Serpentis . . . . .	5.5	Ma	15 21 56.323	2.7801	-.0024	+15 43 8.76	12.778	-0.024
$\epsilon$ Draconis . . . . .	3.5	K0	15 23 4.993	1.3336	+0.0014	+59 15 22.97	12.668	+0.010
32 Libræ . . . . .	5.9	K0	15 23 34.354	3.3790	+0.0006	-16 25 40.70	12.687	-0.043
$\beta$ Coronæ Borealis . . . . .	3.7	Fp	15 24 24.423	3.4738	-.0130	+29 23 28.09	12.509	+0.075
$\epsilon$ Boötis . . . . .	5.2	K0	15 27 56.882	+2.1552	+0.0016	+41 6 55.34	-12.359	-0.014
$\gamma$ Lupi (main) . . . . .	3.0	B3	15 29 36.230	3.9875	-.0020	-40 53 20.03	12.279	-0.049
$\gamma$ Libræ . . . . .	4.0	K0	15 30 52.856	2.4331	+0.0047	-14 30 48.31	12.136	+0.006
$\alpha$ Coronæ Borealis . . . . .	2.3	A0	15 31 10.392	2.5395	+0.0090	+26 59 35.81	12.221	-0.100
$\zeta$ Coronæ Borealis seq. $\dagger$ . . . . .	5.1	B8	15 36 15.152	2.2596	-.0006	+36 54 16.73	11.776	-0.012
$\alpha$ Serpentis . . . . .	2.8	K0	15 40 10.702	+2.9532	+0.0089	+6 41 9.49	-11.442	+0.043
$\beta$ Serpentis . . . . .	3.7	A2	15 42 21.414	2.7886	+0.0054	+15 40 50.67	11.583	-0.035
$\kappa$ Serpentis . . . . .	4.3	K5	15 45 0.164	2.6996	-.0035	+18 23 49.35	11.236	-0.099
$\mu$ Serpentis . . . . .	3.6	A0	15 45 17.206	3.1286	-.0058	-3 10 37.38	11.144	-0.028
12 H. Draconis . . . . .	5.1	A2	15 45 23.868	0.9076	+0.0047	+62 51 20.66	11.176	-0.066
$\epsilon$ Serpentis . . . . .	3.8	A0	15 46 40.625	+2.9885	+0.0081	+4 43 36.86	-10.945	+0.070
$\zeta$ Ursæ Minoris . . . . .	4.3	A2	15 46 59.691	-2.1997	+0.0082	+78 3 1.37	10.985	-0.004
$\beta$ Trianguli Australis . . . . .	3.0	F0	15 47 49.006	+5.2589	-.0290	-63 10 32.92	11.131	-0.408
$\lambda$ Libræ . . . . .	5.1	B3	15 48 30.751	3.4777	-.0017	-19 55 12.01	10.926	-0.046
$\gamma$ Serpentis . . . . .	3.9	F8	15 52 37.106	2.7698	+0.0212	+15 55 54.25	11.131	-1.100
$\epsilon$ Scorpii . . . . .	3.0	B2p	15 53 49.642	+3.6241	-.0010	-25 52 34.10	-10.835	-0.048
$\epsilon$ Coronæ Borealis . . . . .	4.2	K0	15 54 9.009	+2.4824	-.0065	+27 7 2.90	-10.580	-0.067

$\phi$  4".5 a. l.  
 $\epsilon$  2".8 n. pr.

$\delta$  Libræ, var., 2".33, 4".8-6".2  
 $\mu$  Boötis, star 6".7, 106" n.

$\gamma$  Lupi, binary 3".7, 3".9, 0".4  
 $\zeta$  Cor. Bor., comp. 6".0, 6".2 n. pr.

1".7; companion a. pr. The position given is that of the center of gravity of the system.  
 xil remain to be applied to reduce to the position of  $\alpha^3$  Centauri.

# 226 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

β Scorpil, comp. 5<sup>m</sup>.1, 13<sup>''</sup>.3 n. f.  
 α Herculis, star 6<sup>m</sup>.5, 29<sup>''</sup>.7 n. f.  
 ε Cor. Bor., comp. 6<sup>m</sup>.7, 4<sup>''</sup>.6 a. pr.  
 σ Scorpil, star 8<sup>m</sup>, 21<sup>''</sup> pr.  
 η Draconis, comp. 8<sup>m</sup>, 5<sup>''</sup>.4 a. f.

α Scorpil, comp. 7<sup>m</sup>, 3<sup>''</sup>.2 pr.  
 λ Ophiuchi, comp. 6<sup>m</sup>, 1<sup>''</sup>.2 n. f.  
 ζ Herculis, binary, 3<sup>m</sup>.0, 6<sup>m</sup>.0, 1<sup>''</sup>  
 η Oph., binary, 3<sup>m</sup>.2, 3<sup>m</sup>.7, 0<sup>''</sup>.5

α Herculis, var. irreg., 3<sup>m</sup>.1-3<sup>m</sup>.9, dup.  
 comp. 6<sup>m</sup>, 4<sup>''</sup>.6 a. f.  
 δ Herculis, binary, comp. 8<sup>m</sup>, 12<sup>''</sup>  
 a. pr.

# MEAN PLACES OF TEN-DAY STARS, 1917. 227

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

♄ Draco, star 6<sup>m</sup>.1, 30<sup>m</sup>.4 n. l.  
♄ Ophiuchi, comp. 6<sup>m</sup>, 2<sup>m</sup>.1 s.

♄ Lyrae, var., 13<sup>d</sup>.9, 3<sup>m</sup>.4-4<sup>m</sup>.1, star  
7<sup>m</sup>, 46<sup>m</sup>.7 s. l.  
♄ Draco, star 7<sup>m</sup>.6, 32<sup>m</sup>.1 n. pr.

♄ Serpentina, star 5<sup>m</sup>.4, 22<sup>m</sup>.2 s. l.  
R Lyrae, var., 40<sup>d</sup>.4, 4<sup>m</sup>.0-4<sup>m</sup>.7.  
♄ Sag., binary, 3<sup>m</sup>.4, 3<sup>m</sup>.6, 0<sup>m</sup>.5.



# 228 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

β Cygni, star 5<sup>m</sup>.4, 34'' .7 n. f.  
 δ Cygni, comp. 8<sup>m</sup>, 1'' .8 n. pr.  
 η Aquilæ, var., 7<sup>d</sup>.18, 3<sup>m</sup>.7-4<sup>m</sup>.4  
 ε Draconis, comp. 7<sup>m</sup>.8, 3'' .1 n.

ο Cygni, star 5<sup>m</sup>.0 pr. 19<sup>s</sup>, 270'' n.,  
 star 7<sup>m</sup>.8 f. 1<sup>s</sup>, 96'' s.  
 α Cephei, comp. 8<sup>m</sup>, 7'' .5 n. f.  
 α<sup>2</sup> Capricor., α<sup>1</sup> Capricor. 4<sup>m</sup>.6 pr. 24<sup>s</sup>,  
 137'' n.

β Capricor., star 6<sup>m</sup>.2 pr. 14<sup>s</sup>, 10'' s.  
 π Capricor., comp. 9<sup>m</sup>, 3'' .4 n. f.  
 ρ Capricor., comp. 7<sup>m</sup>.6, 2'' .8 s.  
 δ Delphini, binary 4<sup>m</sup>.1, 5<sup>m</sup>.4, 0'' .5  
 γ Delphini, comp. 5<sup>m</sup>.5, 11'' .2 pr.

# MEAN PLACES OF TEN-DAY STARS, 1917. 229

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

•  
• Cygni, comp. 7<sup>m</sup>, 0<sup>m</sup>.3

| • Cygni, star 6<sup>m</sup>.7 f. 10<sup>m</sup>, 420<sup>m</sup> a.

| • Cephei, star 8<sup>m</sup>, 15<sup>m</sup>.3 a. pr.

# 230 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

♂ Pegasi, var. irreg., 2<sup>m</sup>.3-3<sup>m</sup>.7  
\* Cephei, comp. 7<sup>m</sup>, 0<sup>''</sup>.9 f.

♂ Aquarii, star 8<sup>m</sup>.5, 49<sup>''</sup>.4 n. pr.  
o Cephei, comp. 8<sup>m</sup>, 2<sup>''</sup>.9 s. pr.

| 72 Pegasi, binary, 6<sup>m</sup>.0, 6<sup>m</sup>.0, 0<sup>''</sup>.4

# MEAN PLACES OF CIRCUMPOLAR STARS, 1917. 281

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

α Ursa Min., star 9<sup>m</sup>, 15'' s. pr. | 32 H. Camelop., star 5<sup>m</sup>, 19''.8 s. pr. | λ Octantis, binary, 5<sup>m</sup>.5, 3<sup>m</sup>.0, 3''.3 n. l.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 0 57	° ' " +85 49	Jan.	h m 1 29	° ' " +88 52	Jan.	h m 1 41	° ' " -85 11	Jan.	h m 4 10	° ' " +85 20	Jan.	h m 5 35	° ' " +85 9
	s "	"		s "	"		s "	"		s "	"		s "	"
0.3	10.94	12.49	0.3	89.73	10.50	0.3	67.69	34.01	0.4	20.66	27.91	0.5	34.20	39.06
1.3	10.68	12.55	1.3	88.81	10.59	1.3	67.40	34.06	1.4	20.55	28.15	1.5	34.17	39.33
2.3	10.44	12.60	2.3	87.93	10.69	2.3	67.09	34.11	2.4	20.45	28.38	2.4	34.16	39.61
3.3	10.21	12.66	3.3	87.07	10.80	3.3	66.77	34.16	3.4	20.36	28.62	3.4	34.15	39.88
4.3	9.97	12.75	4.3	86.20	10.92	4.3	66.49	34.15	4.4	20.27	28.88	4.4	34.15	40.16
5.3	9.71	12.81	5.3	85.28	11.03	5.3	66.19	34.12	5.4	20.17	29.15	5.4	34.15	40.45
6.2	9.44	12.88	6.3	84.28	11.16	6.3	65.91	34.08	6.4	20.07	29.44	6.4	34.15	40.77
7.2	9.16	12.95	7.3	83.23	11.29	7.3	65.63	34.03	7.4	19.95	29.74	7.4	34.12	41.10
8.2	8.85	13.01	8.3	82.12	11.40	8.3	65.38	33.99	8.4	19.81	30.03	8.4	34.08	41.44
9.2	8.53	13.06	9.3	80.97	11.51	9.3	65.13	33.94	9.4	19.66	30.31	9.4	34.03	41.78
10.2	8.20	13.08	10.3	79.80	11.57	10.3	64.88	33.91	10.4	19.49	30.59	10.4	33.97	42.11
11.2	7.90	13.09	11.3	78.62	11.63	11.3	64.63	33.88	11.4	19.31	30.84	11.4	33.88	42.43
12.2	7.59	13.06	12.3	77.45	11.68	12.3	64.37	33.85	12.4	19.12	31.08	12.4	33.78	42.74
13.2	7.28	13.02	13.2	76.31	11.69	13.3	64.11	33.84	13.4	18.92	31.29	13.4	33.67	43.04
14.2	6.99	12.97	14.2	75.22	11.70	14.3	63.83	33.84	14.4	18.73	31.49	14.4	33.56	43.31
15.2	6.72	12.92	15.2	74.19	11.69	15.3	63.54	33.83	15.4	18.54	31.68	15.4	33.45	43.56
16.2	6.47	12.88	16.2	73.22	11.69	16.2	63.25	33.79	16.4	18.38	31.86	16.4	33.36	43.80
17.2	6.23	12.85	17.2	72.29	11.70	17.2	62.93	33.72	17.3	18.23	32.03	17.4	33.27	44.04
18.2	5.99	12.83	18.2	71.39	11.73	18.2	62.63	33.64	18.3	18.08	32.21	18.4	33.20	44.27
19.2	5.75	12.83	19.2	70.46	11.78	19.2	62.32	33.53	19.3	17.94	32.43	19.4	33.14	44.53
20.2	5.49	12.82	20.2	69.49	11.83	20.2	62.03	33.38	20.3	17.80	32.65	20.4	33.09	44.80
21.2	5.22	12.83	21.2	68.44	11.89	21.2	61.76	33.23	21.3	17.63	32.88	21.4	33.01	45.09
22.2	4.94	12.81	22.2	67.31	11.94	22.2	61.52	33.09	22.3	17.46	33.11	22.4	32.93	45.40
23.2	4.61	12.77	23.2	66.12	11.96	23.2	61.27	32.94	23.3	17.27	33.35	23.4	32.83	45.72
24.2	4.29	12.72	24.2	64.91	11.94	24.2	61.03	32.81	24.3	17.04	33.56	24.4	32.69	46.03
25.2	3.97	12.62	25.2	63.71	11.90	25.2	60.80	32.69	25.3	16.81	33.75	25.4	32.54	46.31
26.2	3.68	12.50	26.2	62.55	11.84	26.2	60.54	32.59	26.3	16.57	33.91	26.4	32.36	46.55
27.2	3.40	12.36	27.2	61.47	11.75	27.2	60.27	32.50	27.3	16.33	34.05	27.4	32.18	46.79
28.2	3.15	12.23	28.2	60.46	11.67	28.2	59.99	32.39	28.3	16.10	34.16	28.4	32.03	46.98
29.2	2.91	12.10	29.2	59.52	11.58	29.2	59.69	32.26	29.3	15.89	34.27	29.4	31.88	47.17
30.2	2.69	11.99	30.2	58.64	11.53	30.2	59.40	32.14	30.3	15.70	34.38	30.4	31.73	47.37
31.2	2.48	11.89	31.2	57.76	11.47	31.2	59.10	32.00	31.3	15.51	34.50	31.4	31.60	47.57
13.72 +13.68			50.70 +50.69			11.93 -11.89			12.31 +12.27			11.86 +11.82		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 5 46	° ' " -84 49	Jan.	h m 6 47	° ' " -80 43	Jan.	h m 7 2	° ' " +87 10	Jan.	h m 7 13	° ' " +82 34	Jan.	h m 7 16	° ' " -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	25.81	48.31	0.5	5.15	36.15	0.5	42.13	53.42	0.5	57.32	27.41	0.5	37.37	2.82
1.5	25.72	48.68	1.5	5.15	36.56	1.5	42.22	53.69	1.5	57.36	27.66	1.5	37.39	3.23
2.5	25.62	49.05	2.5	5.13	36.97	2.5	42.33	53.97	2.5	57.42	27.90	2.5	37.39	3.64
3.5	25.48	49.43	3.5	5.10	37.38	3.5	42.46	54.23	3.5	57.49	28.14	3.5	37.36	4.05
4.5	25.35	49.78	4.5	5.06	37.78	4.5	42.59	54.51	4.5	57.56	28.38	4.5	37.30	4.45
5.4	25.20	50.12	5.5	5.03	38.16	5.5	42.74	54.80	5.5	57.63	28.64	5.5	37.22	4.83
6.4	25.05	50.44	6.5	4.99	38.53	6.5	42.88	55.10	6.5	57.70	28.93	6.5	37.13	5.20
7.4	24.90	50.72	7.5	4.95	38.87	7.5	43.01	55.42	7.5	57.77	29.24	7.5	37.02	5.56
8.4	24.75	51.00	8.5	4.91	39.20	8.5	43.12	55.76	8.5	57.83	29.56	8.5	36.91	5.90
9.4	24.61	51.28	9.5	4.86	39.53	9.5	43.21	56.11	9.5	57.88	29.90	9.5	36.81	6.23
10.4	24.48	51.55	10.5	4.82	39.85	10.5	43.26	56.46	10.5	57.92	30.23	10.5	36.72	6.54
11.4	24.35	51.83	11.5	4.78	40.18	11.5	43.28	56.81	11.5	57.93	30.56	11.5	36.63	6.86
12.4	24.21	52.11	12.5	4.74	40.51	12.5	43.29	57.15	12.5	57.94	30.89	12.5	36.55	7.20
13.4	24.07	52.40	13.5	4.70	40.86	13.5	43.25	57.48	13.5	57.95	31.22	13.5	36.48	7.55
14.4	23.93	52.71	14.5	4.66	41.22	14.5	43.21	57.78	14.5	57.95	31.51	14.5	36.41	7.91
15.4	23.79	53.04	15.5	4.62	41.60	15.5	43.17	58.07	15.5	57.95	31.78	15.5	36.32	8.28
16.4	23.62	53.37	16.5	4.57	41.98	16.5	43.14	58.34	16.5	57.95	32.05	16.5	36.21	8.67
17.4	23.45	53.70	17.5	4.51	42.38	17.5	43.13	58.61	17.5	57.95	32.31	17.5	36.08	9.07
18.4	23.25	54.02	18.5	4.45	42.76	18.5	43.14	58.88	18.5	57.98	32.56	18.5	35.91	9.48
19.4	23.05	54.30	19.5	4.37	43.13	19.5	43.17	59.17	19.5	58.01	32.82	19.5	35.73	9.86
20.4	22.82	54.58	20.4	4.29	43.47	20.5	43.21	59.47	20.5	58.04	33.10	20.5	35.50	10.23
21.4	22.60	54.82	21.4	4.21	43.79	21.5	43.25	59.78	21.5	58.07	33.42	21.5	35.27	10.57
22.4	22.40	55.04	22.4	4.13	44.09	22.5	43.27	60.12	22.5	58.09	33.74	22.5	35.04	10.90
23.4	22.20	55.24	23.4	4.05	44.38	23.5	43.24	60.47	23.5	58.10	34.08	23.5	34.82	11.19
24.4	22.01	55.45	24.4	3.97	44.66	24.4	43.18	60.81	24.5	58.10	34.42	24.5	34.62	11.48
25.4	21.82	55.69	25.4	3.90	44.96	25.4	43.08	61.14	25.5	58.06	34.76	25.5	34.43	11.78
26.4	21.64	55.93	26.4	3.82	45.27	26.4	42.94	61.46	26.5	58.02	35.07	26.5	34.25	12.10
27.4	21.45	56.19	27.4	3.74	45.59	27.4	42.79	61.76	27.4	57.97	35.36	27.5	34.08	12.44
28.4	21.26	56.46	28.4	3.67	45.93	28.4	42.63	62.05	28.4	57.93	35.63	28.4	33.91	12.80
29.4	21.05	56.75	29.4	3.59	46.30	29.4	42.48	62.31	29.4	57.88	35.87	29.4	33.71	13.18
30.4	20.82	57.03	30.4	3.51	46.65	30.4	42.35	62.56	30.4	57.84	36.10	30.4	33.48	13.55
31.4	20.59	57.30	31.4	3.41	46.99	31.4	42.24	62.81	31.4	57.81	36.35	31.4	33.22	13.93
11.10 -11.05			6.21 -6.12			20.35 +20.32			7.74 +7.67			18.50 -18.48		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 8 17	° ' " +88 52	Jan.	h m 9 9	° ' " -85 19	Jan.	h m 9 25	° ' " +81 41	Jan.	h m 9 36	° ' " -80 33	Jan.	h m 10 21	° ' " +82 58
	s 16.68	" 50.38		s 6.86	" 47.99		s 32.61	" 24.46		s 26.82	" 56.57		s 14.97	" 32.37
0.6	16.68	50.38	0.6	6.86	47.99	0.6	32.61	24.46	0.6	26.82	56.57	0.7	14.97	32.37
1.6	17.19	50.64	1.6	7.03	48.34	1.6	32.71	24.64	1.6	26.91	56.91	1.6	15.11	32.50
2.6	17.73	50.89	2.6	7.18	48.72	2.6	32.82	24.80	2.6	27.01	57.27	2.6	15.26	32.62
3.6	18.30	51.12	3.6	7.32	49.11	3.6	32.95	24.95	3.6	27.11	57.65	3.6	15.42	32.71
4.6	18.93	51.36	4.6	7.45	49.49	4.6	33.08	25.10	4.6	27.20	58.02	4.6	15.59	32.79
5.6	19.57	51.59	5.6	7.55	49.86	5.6	33.21	25.26	5.6	27.27	58.40	5.6	15.76	32.88
6.6	20.24	51.87	6.6	7.63	50.23	6.6	33.34	25.43	6.6	27.34	58.78	6.6	15.94	33.01
7.5	20.89	52.15	7.6	7.71	50.59	7.6	33.48	25.63	7.6	27.40	59.11	7.6	16.13	33.14
8.5	21.52	52.45	8.6	7.78	50.93	8.6	33.61	25.85	8.6	27.46	59.45	8.6	16.31	33.29
9.5	22.09	52.78	9.6	7.84	51.27	9.6	33.73	26.09	9.6	27.51	59.79	9.6	16.49	33.47
10.5	22.59	53.11	10.6	7.92	51.60	10.6	33.84	26.34	10.6	27.57	60.12	10.6	16.65	33.66
11.5	23.02	53.43	11.6	8.00	51.93	11.6	33.94	26.60	11.6	27.62	60.44	11.6	16.81	33.87
12.5	23.39	53.75	12.6	8.08	52.26	12.6	34.05	26.86	12.6	27.68	60.77	12.6	16.96	34.08
13.5	23.69	54.08	13.6	8.17	52.59	13.6	34.14	27.13	13.6	27.74	61.11	13.6	17.09	34.29
14.5	23.93	54.40	14.6	8.26	52.94	14.6	34.22	27.37	14.6	27.81	61.46	14.6	17.21	34.49
15.5	24.15	54.70	15.6	8.35	53.32	15.6	34.29	27.61	15.6	27.88	61.82	15.6	17.34	34.70
16.5	24.38	54.97	16.6	8.44	53.72	16.6	34.37	27.84	16.6	27.95	62.19	16.6	17.45	34.90
17.5	24.64	55.24	17.6	8.53	54.13	17.6	34.45	28.04	17.6	28.01	62.60	17.6	17.57	35.08
18.5	24.94	55.47	18.6	8.58	54.55	18.6	34.53	28.24	18.6	28.07	63.02	18.6	17.70	35.24
19.5	25.31	55.73	19.6	8.62	54.97	19.6	34.63	28.46	19.6	28.12	63.45	19.6	17.83	35.40
20.5	25.72	56.00	20.5	8.63	55.41	20.6	34.73	28.68	20.6	28.16	63.88	20.6	17.98	35.57
21.5	26.14	56.31	21.5	8.64	55.82	21.6	34.84	28.90	21.6	28.19	64.29	21.6	18.14	35.75
22.5	26.54	56.65	22.5	8.63	56.19	22.6	34.95	29.16	22.6	28.21	64.66	22.6	18.30	35.95
23.5	26.85	56.99	23.5	8.61	56.54	23.6	35.06	29.45	23.6	28.23	65.04	23.6	18.45	36.18
24.5	27.09	57.34	24.5	8.61	56.88	24.6	35.14	29.76	24.6	28.25	65.38	24.6	18.59	36.45
25.5	27.21	57.71	25.5	8.62	57.23	25.5	35.20	30.09	25.6	28.27	65.72	25.6	18.71	36.72
26.5	27.22	58.04	26.5	8.64	57.58	26.5	35.26	30.38	26.6	28.30	66.08	26.6	18.81	37.00
27.5	27.18	58.36	27.5	8.67	57.95	27.5	35.30	30.67	27.5	28.33	66.45	27.6	18.90	37.27
28.5	27.10	58.66	28.5	8.70	58.34	28.5	35.33	30.95	28.5	28.37	66.84	28.6	18.98	37.52
29.5	27.04	58.94	29.5	8.73	58.75	29.5	35.37	31.21	29.5	28.41	67.25	29.6	19.05	37.76
30.5	27.00	59.21	30.5	8.74	59.17	30.5	35.42	31.45	30.5	28.45	67.67	30.6	19.13	37.99
31.5	27.01	59.48	31.5	8.74	59.61	31.5	35.46	31.70	31.5	28.47	68.11	31.6	19.22	38.21
51.25 +51.24			12.29 -12.25			6.92 +6.85			6.10 -6.02			8.18 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 10 59 s	° ' " -84 8	Jan.	h m 12 14 s	° ' " +88 9	Jan.	h m 12 46 s	° ' " -84 40	Jan.	h m 12 48 s	° ' " +83 51	Jan.	h m 13 27 s	° ' " -85 21
0.7	58.98	37.88	0.7	38.79	9.03	0.8	6.64	9.16	0.8	31.72	23.04	0.8	11.96	29.57
1.7	59.20	38.10	1.7	39.39	9.04	1.8	6.93	9.21	1.8	31.91	22.99	1.8	12.29	29.57
2.7	59.42	38.34	2.7	39.98	9.03	2.7	7.23	9.30	2.7	32.09	22.90	2.8	12.62	29.59
3.7	59.62	38.62	3.7	40.58	8.99	3.7	7.52	9.38	3.7	32.28	22.82	3.8	12.97	29.63
4.7	59.83	38.91	4.7	41.21	8.96	4.7	7.81	9.51	4.7	32.47	22.74	4.8	13.31	29.69
5.7	60.02	39.20	5.7	41.86	8.92	5.7	8.09	9.66	5.7	32.67	22.64	5.8	13.64	29.77
6.7	60.21	39.49	6.7	42.57	8.88	6.7	8.34	9.80	6.7	32.90	22.54	6.8	13.96	29.85
7.7	60.37	39.77	7.7	43.30	8.87	7.7	8.60	9.96	7.7	33.13	22.48	7.8	14.25	29.95
8.7	60.51	40.05	8.7	44.05	8.87	8.7	8.84	10.11	8.7	33.36	22.42	8.8	14.53	30.04
9.7	60.67	40.33	9.7	44.80	8.88	9.7	9.06	10.27	9.7	33.59	22.37	9.8	14.81	30.12
10.7	60.82	40.59	10.7	45.54	8.92	10.7	9.29	10.41	10.7	33.82	22.34	10.8	15.08	30.19
11.7	60.97	40.84	11.7	46.26	8.99	11.7	9.51	10.52	11.7	34.05	22.35	11.8	15.35	30.25
12.6	61.13	41.09	12.7	46.97	9.07	12.7	9.75	10.64	12.7	34.27	22.36	12.7	15.63	30.31
13.6	61.29	41.35	13.7	47.64	9.15	13.7	9.99	10.77	13.7	34.47	22.39	13.7	15.92	30.36
14.6	61.47	41.61	14.7	48.26	9.24	14.7	10.24	10.90	14.7	34.67	22.43	14.7	16.22	30.42
15.6	61.65	41.90	15.7	48.86	9.32	15.7	10.50	11.04	15.7	34.87	22.46	15.7	16.53	30.50
16.6	61.82	42.21	16.7	49.42	9.40	16.7	10.78	11.21	16.7	35.05	22.49	16.7	16.86	30.59
17.6	62.01	42.53	17.7	49.98	9.47	17.7	11.06	11.39	17.7	35.23	22.51	17.7	17.21	30.71
18.6	62.19	42.89	18.7	50.55	9.53	18.7	11.34	11.61	18.7	35.42	22.51	18.7	17.55	30.85
19.6	62.33	43.25	19.7	51.16	9.58	19.7	11.61	11.83	19.7	35.61	22.51	19.7	17.88	31.02
20.6	62.48	43.61	20.7	51.81	9.61	20.7	11.87	12.07	20.7	35.83	22.50	20.7	18.20	31.20
21.6	62.61	43.99	21.7	52.50	9.66	21.7	12.10	12.34	21.7	36.06	22.49	21.7	18.50	31.41
22.6	62.71	44.36	22.7	53.21	9.74	22.7	12.31	12.59	22.7	36.28	22.51	22.7	18.77	31.61
23.6	62.81	44.69	23.7	53.93	9.83	23.7	12.51	12.82	23.7	36.51	22.55	23.7	19.04	31.79
24.6	62.91	45.01	24.7	54.65	9.97	24.7	12.71	13.04	24.7	36.74	22.60	24.7	19.28	31.94
25.6	63.02	45.30	25.7	55.31	10.11	25.7	12.91	13.24	25.7	36.95	22.70	25.7	19.55	32.09
26.6	63.15	45.61	26.7	55.92	10.29	26.7	13.13	13.43	26.7	37.15	22.80	26.7	19.82	32.23
27.6	63.28	45.93	27.7	56.48	10.47	27.7	13.36	13.62	27.7	37.34	22.93	27.7	20.10	32.37
28.6	63.43	46.27	28.7	56.99	10.64	28.7	13.61	13.83	28.7	37.52	23.06	28.7	20.41	32.52
29.6	63.57	46.62	29.7	57.47	10.79	29.7	13.86	14.06	29.7	37.68	23.17	29.7	20.73	32.69
30.6	63.71	46.99	30.6	57.97	10.93	30.7	14.11	14.32	30.7	37.85	23.28	30.7	21.05	32.88
31.6	63.84	47.38	31.6	58.47	11.07	31.7	14.36	14.59	31.7	38.02	23.37	31.7	21.37	33.09
9.80	-9.75		31.02	+31.00		10.76	-10.72		9.34	+9.29		12.36	-12.32	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Jan.	14 13	-83 17	Jan.	15 3	+87 32	Jan.	15 23	-84 11	Jan.	16 54	+82 10	Jan.	17 15	-80 46
	s	"		s	"		s	"		s	"		s	"
0.8	24.85	9.66	0.9	19.12	47.42	0.9	50.93	21.57	0.9	14.86	19.09	0.9	50.39	63.65
1.8	25.07	9.57	1.8	19.46	47.20	1.9	51.15	21.38	1.9	14.92	18.78	1.9	50.47	63.32
2.8	25.30	9.51	2.8	19.78	46.99	2.9	51.39	21.19	2.9	14.97	18.49	2.9	50.59	63.02
3.8	25.54	9.47	3.8	20.09	46.76	3.9	51.64	21.03	3.9	15.02	18.18	3.9	50.69	62.73
4.8	25.78	9.44	4.8	20.42	46.54	4.9	51.89	20.89	4.9	15.06	17.88	4.9	50.82	62.45
5.8	26.02	9.45	5.8	20.76	46.30	5.8	52.15	20.78	5.9	15.12	17.56	5.9	50.95	62.19
6.8	26.25	9.48	6.8	21.13	46.06	6.8	52.39	20.70	6.9	15.18	17.22	6.9	51.07	61.95
7.8	26.46	9.51	7.8	21.54	45.80	7.8	52.64	20.62	7.9	15.26	16.87	7.9	51.19	61.74
8.8	26.66	9.52	8.8	21.98	45.56	8.8	52.86	20.55	8.9	15.34	16.53	8.9	51.30	61.53
9.8	26.87	9.54	9.8	22.43	45.35	9.8	53.09	20.46	9.9	15.43	16.20	9.9	51.40	61.32
10.8	27.06	9.56	10.8	22.90	45.15	10.8	53.29	20.37	10.9	15.52	15.87	10.9	51.51	61.10
11.8	27.25	9.57	11.8	23.38	44.96	11.8	53.50	20.28	11.9	15.61	15.55	11.9	51.60	60.88
12.8	27.45	9.57	12.8	23.86	44.79	12.8	53.72	20.19	12.9	15.69	15.25	12.9	51.70	60.66
13.8	27.65	9.57	13.8	24.33	44.65	13.8	53.95	20.07	13.9	15.81	14.96	13.9	51.80	60.42
14.8	27.87	9.56	14.8	24.77	44.51	14.8	54.17	19.95	14.9	15.91	14.70	14.9	51.91	60.16
15.8	28.09	9.57	15.8	25.20	44.38	15.8	54.41	19.83	15.9	16.01	14.46	15.9	52.02	59.90
16.8	28.32	9.57	16.8	25.62	44.26	16.8	54.68	19.73	16.9	16.10	14.22	16.9	52.15	59.65
17.8	28.57	9.61	17.8	26.00	44.13	17.8	54.95	19.64	17.9	16.19	13.98	17.9	52.29	59.41
18.8	28.82	9.68	18.8	26.39	43.99	18.8	55.23	19.58	18.9	16.28	13.72	18.9	52.44	59.17
19.8	29.07	9.77	19.8	26.79	43.81	19.8	55.52	19.54	19.9	16.37	13.44	19.9	52.60	58.96
20.8	29.31	9.88	20.8	27.21	43.63	20.8	55.81	19.53	20.9	16.45	13.16	20.9	52.76	58.77
21.8	29.54	10.02	21.8	27.66	43.46	21.8	56.09	19.54	21.9	16.55	12.86	21.9	52.93	58.62
22.8	29.75	10.16	22.8	28.16	43.28	22.8	56.34	19.56	22.9	16.66	12.55	22.9	53.07	58.48
23.8	29.95	10.28	23.8	28.67	43.13	23.8	56.58	19.57	23.9	16.78	12.26	23.9	53.21	58.35
24.7	30.14	10.38	24.8	29.21	43.00	24.8	56.81	19.56	24.9	16.91	11.97	24.9	53.34	58.19
25.7	30.33	10.46	25.8	29.74	42.90	25.8	57.04	19.55	25.9	17.04	11.72	25.9	53.46	58.02
26.7	30.53	10.55	26.8	30.26	42.84	26.8	57.27	19.52	26.9	17.17	11.49	26.9	53.58	57.84
27.7	30.75	10.62	27.8	30.76	42.78	27.8	57.51	19.47	27.9	17.31	11.29	27.9	53.71	57.65
28.7	30.97	10.69	28.8	31.28	42.74	28.8	57.77	19.43	28.8	17.43	11.11	28.9	53.84	57.46
29.7	31.20	10.77	29.8	31.78	42.70	29.8	58.04	19.39	29.8	17.56	10.93	29.9	53.99	57.23
30.7	31.45	10.86	30.8	32.10	42.65	30.8	58.32	19.38	30.8	17.67	10.75	30.9	54.16	57.03
31.7	31.69	11.01	31.8	32.52	42.60	31.8	58.62	19.39	31.8	17.79	10.57	31.9	54.32	56.84
8.33	14.49	-83.55	23.53	15.23	-87.55	9.58	15.23	-84.11	7.54	16.54	-82.10	6.24	17.15	-80.16
14.8	15.23	-83.55	15.2	15.23	-87.55	15.2	15.23	-84.11	16.2	16.54	-82.10	17.2	17.15	-80.16
25.7	17.23	-83.55	25.7	17.23	-87.55	25.7	17.23	-84.11	25.7	17.23	-82.10	25.7	17.23	-80.16

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 17 58	° ' +86 36	Jan.	h m 18 5	° ' -87 39	Jan.	h m 19 0	° ' +89 0	Jan.	h m 19 26	° ' -89 13	Jan.	h m 20 48	° ' +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
0.9	32.24	44.64	0.9	50.69	51.56	1.0	54.17	63.20	1.0	39.88	32.96	1.1	29.69	42.76
1.9	32.28	44.34	1.9	50.91	51.18	2.0	53.94	62.90	2.0	39.81	32.57	2.1	29.61	42.52
2.9	32.30	44.06	2.9	51.16	50.79	3.0	53.66	62.61	3.0	39.86	32.16	3.1	29.53	42.30
3.9	32.30	43.77	3.9	51.44	50.43	4.0	53.34	62.34	4.0	40.03	31.76	4.1	29.45	42.07
4.9	32.31	43.45	4.9	51.75	50.09	5.0	52.99	62.04	5.0	40.33	31.38	5.1	29.36	41.83
5.9	32.32	43.13	5.9	52.09	49.77	5.9	52.64	61.72	6.0	40.69	31.01	6.1	29.27	41.59
6.9	32.33	42.79	6.9	52.43	49.47	6.9	52.31	61.41	7.0	41.09	30.65	7.1	29.18	41.31
7.9	32.37	42.45	7.9	52.76	49.19	7.9	52.03	61.07	8.0	41.50	30.31	8.1	29.07	41.03
8.9	32.42	42.08	8.9	53.08	48.91	8.9	51.81	60.71	9.0	41.90	29.99	9.1	28.98	40.72
9.9	32.51	41.71	9.9	53.38	48.65	9.9	51.65	60.35	10.0	42.28	29.68	10.1	28.90	40.41
10.9	32.59	41.36	10.9	53.67	48.37	10.9	51.58	59.99	11.0	42.61	29.35	11.1	28.81	40.09
11.9	32.70	41.01	11.9	53.95	48.09	11.9	51.59	59.64	12.0	42.89	29.02	12.1	28.75	39.76
12.9	32.83	40.68	12.9	54.23	47.81	12.9	51.66	59.29	12.9	43.15	28.68	13.1	28.68	39.42
13.9	32.96	40.35	13.9	54.50	47.50	13.9	51.77	58.95	13.9	43.41	28.34	14.1	28.63	39.09
14.9	33.10	40.07	14.9	54.79	47.19	14.9	51.93	58.65	14.9	43.68	27.98	15.0	28.58	38.79
15.9	33.24	39.79	15.9	55.11	46.87	15.9	52.07	58.36	15.9	44.01	27.60	16.0	28.54	38.51
16.9	33.37	39.52	16.9	55.47	46.54	16.9	52.18	58.08	16.9	44.44	27.22	17.0	28.50	38.24
17.9	33.47	39.26	17.9	55.88	46.20	17.9	52.25	57.80	17.9	45.00	26.81	18.0	28.46	38.00
18.9	33.57	38.98	18.9	56.33	45.89	18.9	52.27	57.52	18.9	45.70	26.42	19.0	28.42	37.73
19.9	33.67	38.68	19.9	56.81	45.60	19.9	52.24	57.24	19.9	46.53	26.04	20.0	28.36	37.46
20.9	33.76	38.37	20.9	57.32	45.32	20.9	52.18	56.92	20.9	47.46	25.70	21.0	28.30	37.16
21.9	33.86	38.04	21.9	57.81	45.08	21.9	52.17	56.58	21.9	48.40	25.36	22.0	28.24	36.84
22.9	34.00	37.70	22.9	58.28	44.85	22.9	52.25	56.21	22.9	49.33	25.04	23.0	28.18	36.50
23.9	34.16	37.36	23.9	58.72	44.63	23.9	52.40	55.85	23.9	50.17	24.75	24.0	28.13	36.15
24.9	34.35	37.02	24.9	59.14	44.42	24.9	52.66	55.49	24.9	50.93	24.46	25.0	28.09	35.79
25.9	34.57	36.72	25.9	59.52	44.18	25.9	53.04	55.15	25.9	51.59	24.14	26.0	28.06	35.44
26.9	34.79	36.43	26.9	59.90	43.90	26.9	53.49	54.83	26.9	52.21	23.81	27.0	28.04	35.09
27.9	35.01	36.19	27.9	60.30	43.62	27.9	53.97	54.54	27.9	52.84	23.45	28.0	28.04	34.75
28.9	35.24	35.95	28.9	60.72	43.33	28.9	54.45	54.26	28.9	53.54	23.09	29.0	28.04	34.45
29.9	35.44	35.72	29.9	61.19	43.04	29.9	54.88	54.01	29.9	54.33	22.72	30.0	28.04	34.17
30.9	35.64	35.49	30.9	61.69	42.76	30.9	55.27	53.77	30.9	55.24	22.35	31.0	28.04	33.91
31.9	35.82	35.26	31.9	62.23	42.49	31.9	55.64	53.50	31.9	56.28	21.99	32.0	28.03	33.63
16.92 +16.89			24.52 -24.50			58.24 +58.23			73.87 -73.86			7.39 +7.33		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51''.17			-87° 39' 51''.82			+89° 1' 2''.17			-89° 13' 28''.57			+82° 13' 29''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 21 38	° ' " -83 6	Jan.	h m 22 15	° ' " -86 23	Jan.	h m 22 37	° ' " -81 49	Jan.	h m 23 27	° ' " +86 51	Jan.	h m 23 47	° ' " -82 28
	s "			s "			s "			s "			s "	
1.1	15.83	17.67	1.1	62.64	39.06	1.2	37.43	14.78	1.2	32.94	24.28	1.2	16.63	61.91
2.1	15.72	17.36	2.1	62.36	38.78	2.2	37.30	14.53	2.2	32.61	24.23	2.2	16.46	61.78
3.1	15.61	17.03	3.1	62.09	38.46	3.2	37.18	14.27	3.2	32.29	24.19	3.2	16.29	61.62
4.1	15.52	16.69	4.1	61.86	38.15	4.2	37.08	14.00	4.2	31.95	24.15	4.2	16.14	61.44
5.1	15.45	16.36	5.1	61.64	37.83	5.2	36.97	13.72	5.2	31.59	24.11	5.2	15.98	61.23
6.1	15.39	16.02	6.1	61.44	37.52	6.1	36.87	13.44	6.2	31.22	24.06	6.2	15.84	61.03
7.1	15.33	15.70	7.1	61.26	37.22	7.1	36.79	13.17	7.2	30.83	24.01	7.2	15.71	60.82
8.1	15.28	15.40	8.1	61.10	36.93	8.1	36.72	12.91	8.2	30.42	23.94	8.2	15.58	60.63
9.1	15.23	15.11	9.1	60.94	36.65	9.1	36.64	12.65	9.2	30.01	23.85	9.2	15.46	60.44
10.1	15.17	14.82	10.1	60.77	36.37	10.1	36.56	12.41	10.2	29.60	23.73	10.2	15.33	60.25
11.1	15.11	14.53	11.1	60.60	36.10	11.1	36.48	12.17	11.2	29.20	23.60	11.2	15.21	60.08
12.1	15.05	14.24	12.1	60.43	35.83	12.1	36.39	11.93	12.2	28.82	23.45	12.2	15.09	59.93
13.1	14.97	13.95	13.1	60.24	35.55	13.1	36.30	11.69	13.2	28.45	23.28	13.2	14.94	59.76
14.1	14.90	13.64	14.1	60.03	35.26	14.1	36.19	11.42	14.2	28.12	23.11	14.2	14.79	59.58
15.1	14.82	13.33	15.1	59.82	34.95	15.1	36.09	11.16	15.2	27.79	22.96	15.2	14.64	59.40
16.1	14.74	13.00	16.1	59.61	34.64	16.1	35.99	10.87	16.2	27.51	22.81	16.2	14.48	59.19
17.1	14.68	12.63	17.1	59.40	34.31	17.1	35.88	10.56	17.2	27.22	22.67	17.2	14.33	58.96
18.1	14.62	12.26	18.1	59.22	33.94	18.1	35.79	10.24	18.2	26.93	22.57	18.2	14.19	58.70
19.1	14.59	11.87	19.1	59.07	33.56	19.1	35.73	9.90	19.1	26.63	22.46	19.2	14.05	58.42
20.1	14.57	11.47	20.1	58.95	33.19	20.1	35.66	9.53	20.1	26.31	22.33	20.2	13.92	58.14
21.1	14.56	11.09	21.1	58.86	32.80	21.1	35.61	9.16	21.1	25.98	22.21	21.2	13.83	57.85
22.1	14.57	10.73	22.1	58.78	32.42	22.1	35.58	8.82	22.1	25.61	22.08	22.2	13.73	57.55
23.1	14.57	10.39	23.1	58.73	32.09	23.1	35.54	8.48	23.1	25.23	21.91	23.2	13.63	57.26
24.1	14.57	10.05	24.1	58.65	31.77	24.1	35.50	8.17	24.1	24.86	21.72	24.1	13.55	57.02
25.1	14.56	9.73	25.1	58.56	31.45	25.1	35.45	7.89	25.1	24.51	21.49	25.1	13.45	56.78
26.1	14.53	9.42	26.1	58.43	31.13	26.1	35.39	7.60	26.1	24.19	21.26	26.1	13.32	56.54
27.1	14.49	9.09	27.1	58.31	30.81	27.1	35.31	7.31	27.1	23.90	21.02	27.1	13.20	56.30
28.0	14.45	8.73	28.1	58.16	30.46	28.1	35.23	7.00	28.1	23.65	20.79	28.1	13.07	56.04
29.0	14.41	8.37	29.1	58.01	30.10	29.1	35.15	6.67	29.1	23.41	20.57	29.1	12.93	55.77
30.0	14.38	7.99	30.1	57.87	29.73	30.1	35.08	6.30	30.1	23.19	20.36	30.1	12.81	55.46
31.0	14.37	7.57	31.1	57.77	29.33	31.1	35.03	5.94	31.1	22.96	20.17	31.1	12.68	55.15
32.0	14.37	7.15	32.1	57.70	28.93	32.1	34.98	5.55	32.1	22.72	19.98	32.1	12.58	54.81
8.33      -8.27			15.89    -15.86			7.03      -6.96			18.24    +18.21			7.64      -7.58		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 0 56	° ' " +85 49	Feb.	h m 1 29	° ' " +88 52	Feb.	h m 1 41	° ' " -85 11	Feb.	h m 4 10	° ' " +85 20	Feb.	h m 5 35	° ' " +85 9
	s 0.2	" 62.48		s 0.2	" 57.76		s 0.2	" 59.10		s 0.3	" 15.51		s 0.4	" 31.60
	1.2	11.89		1.2	11.47		1.2	32.00		1.3	34.50		1.4	47.57
	2.2	11.79		2.2	11.41		2.2	31.81		2.3	34.64		2.4	47.79
	3.2	11.69		3.2	11.36		3.2	31.61		3.3	34.78		3.4	48.02
	4.2	11.59		4.2	11.31		4.2	31.41		4.3	34.91		4.4	48.26
	5.2	11.46		5.2	11.24		5.2	31.21		5.3	35.05		5.4	48.50
	6.2	11.34		6.2	11.18		6.2	31.00		6.3	35.20		6.4	43 74
	7.2	11.20		7.2	11.09		7.2	30.80		7.3	35.35		7.3	48.99
	8.2	11.04		8.2	10.97		8.2	30.61		8.3	35.49		8.3	49.22
	9.2	10.86		9.2	10.84		9.2	30.43		9.3	35.58		9.3	49.42
	10.1	10.66		10.1	10.67		10.1	30.25		10.2	35.66		10.2	49.62
	11.1	10.44		11.1	10.50		11.1	30.09		11.3	35.72		11.3	49.77
	12.1	10.22		12.1	10.32		12.1	29.92		12.3	35.76		12.3	49.93
	13.1	10.01		13.1	10.15		13.1	29.74		13.3	35.77		13.3	50.08
	14.1	9.82		14.1	9.97		14.1	29.55		14.3	35.79		14.3	50.22
	15.1	9.62		15.1	9.82		15.1	29.31		15.3	35.81		15.3	50.33
	16.1	9.44		16.1	9.69		16.1	29.09		16.3	35.85		16.3	50.46
	17.1	9.28		17.1	9.56		17.1	28.82		17.3	35.90		17.3	50.61
	18.1	9.13		18.1	9.45		18.1	28.53		18.3	35.98		18.3	50.78
	19.1	8.97		19.1	9.33		19.1	28.22		19.3	36.07		19.3	50.95
	20.1	8.79		20.1	9.19		20.1	27.91		20.3	36.15		20.3	51.14
	21.1	8.57		21.1	9.03		21.1	27.63		21.3	36.22		21.3	51.32
	22.1	8.34		22.1	8.85		22.1	27.38		22.3	36.27		22.3	51.47
	23.1	8.07		23.1	8.61		23.1	27.14		23.2	36.28		23.2	51.61
	24.1	7.79		24.1	8.38		24.1	26.91		24.3	36.25		24.3	51.71
	25.1	7.51		25.1	8.13		25.1	26.68		25.2	36.19		25.2	51.79
	26.1	7.24		26.1	7.89		26.1	26.44		25.3	36.13		25.3	51.84
	27.1	7.00		27.1	7.64		27.1	26.17		26.2	36.08		26.2	51.89
	28.1	6.75		28.1	7.44		28.1	25.91		26.3	36.04		26.3	51.94
	29.1	6.52		29.1	7.24		29.1	25.59		27.2	36.00		27.2	52.00
	30.1	6.29		30.1	7.02		30.1	25.26		28.2	35.98		28.2	52.08
	31.1	6.05		31.1	6.82		31.1	24.93		29.2	35.95		29.2	52.16
	13.72	+13.68		50.68	+50.67		11.93	-11.89		30.2	35.94		30.2	52.26
	0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			31.2	8.07		31.2	52.26
	+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			12.32	+12.28		11.86	+11.82
										4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561		5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
										+85° 20' 10".34		+85° 9' 30".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensæ. Mag. 6.2			♄ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	5 46	−84 49	Feb.	6 46	−80 43	Feb.	7 2	+87 11	Feb.	7 13	+82 34	Feb.	7 16	−86 54
	s	"		s	"		s	"		s	"		s	"
0.4	20.59	57.30	0.4	63.41	46.99	0.4	42.24	2.81	0.4	57.81	36.35	0.4	33.22	13.93
1.4	20.34	57.54	1.4	63.32	47.32	1.4	42.15	3.08	1.4	57.78	36.62	1.4	32.95	14.28
2.4	20.10	57.75	2.4	63.22	47.63	2.4	42.04	3.36	2.4	57.77	36.90	2.4	32.67	14.61
3.4	19.85	57.95	3.4	63.11	47.92	3.4	41.94	3.65	3.4	57.74	37.18	3.4	32.37	14.92
4.4	19.60	58.13	4.4	63.01	48.18	4.4	41.82	3.96	4.4	57.71	37.49	4.4	32.07	15.21
5.4	19.37	58.30	5.4	62.90	48.43	5.4	41.67	4.28	5.4	57.67	37.80	5.4	31.78	15.49
6.4	19.13	58.47	6.4	62.80	48.67	6.4	41.49	4.61	6.4	57.62	38.12	6.4	31.49	15.77
7.4	18.91	58.64	7.4	62.69	48.92	7.4	41.29	4.92	7.4	57.55	38.43	7.4	31.21	16.04
8.4	18.68	58.80	8.4	62.59	49.17	8.4	41.06	5.23	8.4	57.47	38.72	8.4	30.94	16.32
9.4	18.47	58.98	9.4	62.49	49.43	9.4	40.80	5.52	9.4	57.38	39.01	9.4	30.68	16.61
10.3	18.24	59.16	10.4	62.39	49.70	10.4	40.53	5.79	10.4	57.29	39.28	10.4	30.42	16.90
11.3	18.01	59.37	11.4	62.28	49.97	11.4	40.25	6.03	11.4	57.20	39.53	11.4	30.16	17.21
12.3	17.77	59.58	12.4	62.18	50.27	12.4	39.98	6.26	12.4	57.10	39.76	12.4	29.89	17.54
13.3	17.52	59.79	13.4	62.07	50.57	13.4	39.73	6.48	13.4	57.02	39.99	13.4	29.58	17.86
14.3	17.25	60.00	14.4	61.95	50.87	14.4	39.50	6.69	14.4	56.94	40.20	14.4	29.26	18.19
15.3	16.97	60.19	15.4	61.83	51.16	15.4	39.30	6.90	15.4	56.87	40.41	15.4	28.90	18.51
16.3	16.69	60.34	16.4	61.70	51.41	16.4	39.10	7.12	16.4	56.81	40.64	16.4	28.53	18.80
17.3	16.40	60.49	17.4	61.56	51.64	17.4	38.91	7.36	17.4	56.75	40.88	17.4	28.13	19.09
18.3	16.11	60.60	18.4	61.42	51.85	18.4	38.71	7.62	18.4	56.70	41.14	18.4	27.73	19.33
19.3	15.83	60.69	19.4	61.29	52.05	19.4	38.49	7.89	19.4	56.62	41.40	19.4	27.34	19.56
20.3	15.56	60.77	20.4	61.16	52.24	20.4	38.22	8.17	20.4	56.54	41.69	20.4	26.97	19.76
21.3	15.31	60.86	21.4	61.03	52.42	21.4	37.92	8.44	21.4	56.43	41.97	21.4	26.62	19.98
22.3	15.06	60.96	22.4	60.90	52.61	22.4	37.58	8.68	22.4	56.30	42.22	22.4	26.28	20.22
23.3	14.81	61.09	23.4	60.78	52.81	23.4	37.22	8.89	23.4	56.18	42.44	23.4	25.95	20.47
24.3	14.55	61.22	24.4	60.66	53.04	24.4	36.85	9.09	24.4	56.04	42.64	24.4	25.61	20.73
25.3	14.28	61.36	25.4	60.53	53.29	25.4	36.50	9.27	25.4	55.91	42.83	25.4	25.26	21.00
26.3	14.01	61.51	26.3	60.41	53.54	26.4	36.17	9.42	26.4	55.80	42.98	26.4	24.90	21.29
27.3	13.72	61.65	27.3	60.27	53.79	27.4	35.85	9.57	27.4	55.70	43.13	27.4	24.52	21.56
28.3	13.43	61.76	28.3	60.13	54.00	28.4	35.56	9.73	28.4	55.60	43.28	28.4	24.11	21.82
29.3	13.14	61.87	29.3	59.98	54.20	29.4	35.27	9.90	29.4	55.49	43.45	29.4	23.68	22.06
30.3	12.84	61.93	30.3	59.83	54.39	30.3	34.98	10.08	30.4	55.40	43.64	30.4	23.24	22.30
31.3	12.54	61.99	31.3	59.69	54.54	31.3	34.67	10.26	31.4	55.29	43.84	31.4	22.81	22.49
11.10 −11.06			6.21 −6.13			20.36 +20.34			7.74 +7.68			18.52 −18.49		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
−84° 49' 46".89			−80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			−86° 54' 6".70		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	8 17	+88 52	Feb.	9 9	−85 19	Feb.	9 25	+81 41	Feb.	9 36	−80 34	Feb.	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.5	27.01	59.48	0.5	8.74	59.61	0.5	35.46	31.70	0.5	28.47	8.11	0.6	19.22	38.21
1.5	27.05	59.75	1.5	8.72	60.04	1.5	35.51	31.94	1.5	28.48	8.55	1.6	19.32	38.43
2.5	27.11	60.06	2.5	8.69	60.45	2.5	35.57	32.21	2.5	28.49	8.98	2.6	19.42	38.66
3.5	27.16	60.37	3.5	8.64	60.85	3.5	35.64	32.49	3.5	28.49	9.39	3.6	19.53	38.91
4.5	27.19	60.70	4.5	8.58	61.22	4.5	35.69	32.79	4.5	28.49	9.77	4.6	19.63	39.17
5.5	27.18	61.03	5.5	8.52	61.58	5.5	35.74	33.10	5.5	28.49	10.16	5.6	19.73	39.44
6.5	27.10	61.40	6.5	8.46	61.94	6.5	35.79	33.41	6.5	28.48	10.52	6.6	19.83	39.75
7.5	26.94	61.74	7.5	8.40	62.29	7.5	35.82	33.74	7.5	28.47	10.88	7.5	19.92	40.06
8.5	26.71	62.08	8.5	8.35	62.64	8.5	35.84	34.08	8.5	28.46	11.23	8.5	19.98	40.38
9.5	26.42	62.42	9.5	8.30	63.00	9.5	35.85	34.41	9.5	28.45	11.60	9.5	20.03	40.70
10.5	26.07	62.74	10.5	8.26	63.36	10.5	35.85	34.73	10.5	28.46	11.96	10.5	20.08	41.02
11.5	25.70	63.04	11.5	8.23	63.74	11.5	35.84	35.05	11.5	28.46	12.34	11.5	20.12	41.32
12.4	25.30	63.33	12.5	8.19	64.11	12.5	35.83	35.34	12.5	28.46	12.75	12.5	20.15	41.61
13.4	24.92	63.60	13.5	8.15	64.53	13.5	35.82	35.62	13.5	28.46	13.15	13.5	20.18	41.89
14.4	24.59	63.85	14.5	8.09	64.94	14.5	35.82	35.88	14.5	28.45	13.58	14.5	20.21	42.16
15.4	24.31	64.11	15.5	8.00	65.37	15.5	35.84	36.14	15.5	28.44	14.02	15.5	20.26	42.41
16.4	24.09	64.38	16.5	7.90	65.79	16.5	35.86	36.40	16.5	28.41	14.46	16.5	20.31	42.65
17.4	23.90	64.65	17.5	7.78	66.19	17.5	35.89	36.67	17.5	28.38	14.88	17.5	20.38	42.91
18.4	23.68	64.96	18.5	7.64	66.57	18.5	35.91	36.94	18.5	28.34	15.27	18.5	20.45	43.20
19.4	23.43	65.27	19.5	7.50	66.93	19.5	35.92	37.26	19.5	28.30	15.64	19.5	20.51	43.50
20.4	23.09	65.58	20.5	7.37	67.26	20.5	35.93	37.59	20.5	28.25	16.00	20.5	20.56	43.82
21.4	22.66	65.90	21.5	7.25	67.59	21.5	35.93	37.93	21.5	28.21	16.35	21.5	20.60	44.15
22.4	22.12	66.23	22.5	7.15	67.92	22.5	35.90	38.26	22.5	28.16	16.71	22.5	20.60	44.49
23.4	21.51	66.52	23.5	7.05	68.27	23.5	35.86	38.59	23.5	28.13	17.07	23.5	20.61	44.83
24.4	20.84	66.78	24.5	6.95	68.63	24.5	35.82	38.89	24.5	28.11	17.45	24.5	20.60	45.15
25.4	20.18	67.02	25.5	6.85	69.01	25.5	35.77	39.17	25.5	28.08	17.84	25.5	20.58	45.45
26.4	19.55	67.26	26.4	6.75	69.40	26.5	35.72	39.43	26.5	28.05	18.25	26.5	20.57	45.73
27.4	18.97	67.48	27.4	6.63	69.81	27.5	35.68	39.68	27.5	28.02	18.67	27.5	20.55	46.02
28.4	18.41	67.70	28.4	6.50	70.20	28.5	35.65	39.94	28.5	27.98	19.08	28.5	20.55	46.29
29.4	17.89	67.94	29.4	6.35	70.58	29.5	35.62	40.19	29.5	27.94	19.48	29.5	20.55	46.56
30.4	17.38	68.21	30.4	6.18	70.95	30.5	35.60	40.47	30.5	27.88	19.86	30.5	20.57	46.84
31.4	16.87	68.46	31.4	6.01	71.29	31.4	35.58	40.75	31.5	27.82	20.24	31.5	20.58	47.15
51.37 +51.36			12.30 −12.25			6.92 +6.85			6.10 −6.02			8.18 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			−85° 19' 57''.45			+81° 41' 41''.50			−80° 34' 6''.83			+82° 58' 54''.07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			82 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 11 0	° ' -84 8	Feb.	h m 12 14	° ' +88 9	Feb.	h m 12 46	° ' -84 40	Feb.	h m 12 48	° ' +83 51	Feb.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	3.84	47.38	0.6	58.47	11.07	0.7	14.36	14.59	0.7	38.02	23.37	0.7	21.37	33.09
1.6	3.95	47.78	1.6	59.01	11.22	1.7	14.61	14.87	1.7	38.20	23.46	1.7	21.68	33.33
2.6	4.05	48.17	2.6	59.57	11.36	2.7	14.84	15.17	2.7	38.38	23.55	2.7	21.97	33.57
3.6	4.14	48.56	3.6	60.16	11.49	3.7	15.03	15.47	3.7	38.58	23.64	3.7	22.24	33.80
4.6	4.22	48.95	4.6	60.76	11.66	4.7	15.22	15.76	4.7	38.79	23.75	4.7	22.49	34.04
5.6	4.28	49.32	5.6	61.37	11.85	5.7	15.40	16.06	5.7	38.99	23.88	5.7	22.73	34.28
6.6	4.34	49.68	6.6	61.96	12.05	6.7	15.59	16.34	6.7	39.20	24.03	6.7	22.97	34.53
7.6	4.40	50.03	7.6	62.54	12.26	7.7	15.76	16.62	7.7	39.40	24.19	7.7	23.21	34.73
8.6	4.49	50.36	8.6	63.09	12.49	8.6	15.93	16.87	8.6	39.58	24.37	8.7	23.44	34.93
9.6	4.56	50.70	9.6	63.59	12.73	9.6	16.11	17.12	9.6	39.75	24.57	9.7	23.67	35.14
10.6	4.64	51.05	10.6	64.06	12.98	10.6	16.29	17.37	10.6	39.91	24.78	10.7	23.92	35.35
11.6	4.72	51.41	11.6	64.48	13.24	11.6	16.49	17.64	11.6	40.06	25.00	11.7	24.19	35.55
12.6	4.81	51.78	12.6	64.87	13.49	12.6	16.70	17.93	12.6	40.21	25.22	12.7	24.46	35.78
13.6	4.91	52.16	13.6	65.24	13.72	13.6	16.92	18.23	13.6	40.34	25.42	13.7	24.75	36.02
14.6	5.00	52.58	14.6	65.60	13.93	14.6	17.14	18.55	14.6	40.48	25.60	14.7	25.04	36.30
15.6	5.06	53.01	15.6	65.98	14.14	15.6	17.34	18.89	15.6	40.62	25.77	15.7	25.32	36.59
16.6	5.12	53.44	16.6	66.40	14.34	16.6	17.54	19.26	16.6	40.78	25.92	16.7	25.59	36.91
17.5	5.16	53.89	17.6	66.86	14.54	17.6	17.72	19.63	17.6	40.94	26.07	17.7	25.84	37.24
18.5	5.17	54.31	18.6	67.34	14.73	18.6	17.87	20.00	18.6	41.11	26.24	18.6	26.06	37.56
19.5	5.19	54.70	19.6	67.84	14.96	19.6	18.01	20.35	19.6	41.29	26.42	19.6	26.26	37.87
20.5	5.20	55.08	20.6	68.33	15.20	20.6	18.14	20.69	20.6	41.47	26.61	20.6	26.45	38.18
21.5	5.22	55.44	21.6	68.77	15.48	21.6	18.26	21.02	21.6	41.62	26.84	21.6	26.64	38.46
22.5	5.25	55.80	22.6	69.16	15.77	22.6	18.40	21.32	22.6	41.77	27.11	22.6	26.85	38.72
23.5	5.28	56.17	23.6	69.49	16.07	23.6	18.54	21.63	23.6	41.90	27.38	23.6	27.06	38.97
24.5	5.33	56.53	24.6	69.77	16.37	24.6	18.72	21.93	24.6	42.00	27.66	24.6	27.29	39.24
25.5	5.37	56.92	25.6	70.00	16.66	25.6	18.90	22.24	25.6	42.10	27.93	25.6	27.54	39.52
26.5	5.42	57.31	26.6	70.22	16.94	26.6	19.07	22.58	26.6	42.19	28.17	26.6	27.79	39.82
27.5	5.46	57.75	27.6	70.44	17.18	27.6	19.24	22.95	27.6	42.29	28.40	27.6	28.04	40.14
28.5	5.49	58.18	28.6	70.68	17.45	28.6	19.40	23.32	28.6	42.40	28.62	28.6	28.27	40.47
29.5	5.50	58.61	29.6	70.96	17.71	29.6	19.55	23.70	29.6	42.51	28.84	29.6	28.50	40.79
30.5	5.49	59.04	30.6	71.27	17.97	30.6	19.69	24.09	30.6	42.64	29.07	30.6	28.70	41.16
31.5	5.48	59.46	31.6	71.58	18.23	31.6	19.79	24.49	31.6	42.77	29.31	31.6	28.88	41.50
9.81      -9.76			31.04    +31.02			10.77    -10.72			9.35      +9.29			12.36    -12.32		
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	14 13	−83 17	Feb.	15 3	+87 32	Feb.	15 23	−84 11	Feb.	16 54	+82 10	Feb.	17 15	−80 46
	s	"		s	"		s	"		s	"		s	"
0.7	31.69	11.01	0.8	32.53	42.60	0.8	58.62	19.39	0.8	17.79	10.57	0.9	54.32	56.84
1.7	31.93	11.18	1.8	32.98	42.52	1.8	58.91	19.42	1.8	17.90	10.37	1.9	54.49	56.69
2.7	32.15	11.36	2.8	33.45	42.45	2.8	59.19	19.48	2.8	18.03	10.14	2.8	54.66	56.56
3.7	32.37	11.54	3.8	33.95	42.37	3.8	59.46	19.54	3.8	18.16	9.93	3.8	54.83	56.44
4.7	32.57	11.72	4.8	34.47	42.29	4.8	59.71	19.60	4.8	18.30	9.71	4.8	54.99	56.34
5.7	32.76	11.90	5.8	35.01	42.23	5.8	59.96	19.68	5.8	18.44	9.50	5.8	55.14	56.25
6.7	32.95	12.07	6.7	35.56	42.18	6.8	60.20	19.76	6.8	18.59	9.29	6.8	55.29	56.15
7.7	33.13	12.25	7.7	36.11	42.15	7.8	60.43	19.81	7.8	18.74	9.09	7.8	55.42	56.06
8.7	33.32	12.39	8.7	36.66	42.14	8.8	60.67	19.87	8.8	18.91	8.91	8.8	55.56	55.96
9.7	33.51	12.53	9.7	37.21	42.17	9.8	60.90	19.91	9.8	19.06	8.77	9.8	55.70	55.82
10.7	33.69	12.68	10.7	37.73	42.20	10.8	61.14	19.95	10.8	19.21	8.63	10.8	55.84	55.69
11.7	33.91	12.83	11.7	38.22	42.25	11.7	61.40	19.98	11.8	19.37	8.53	11.8	55.98	55.55
12.7	34.13	13.00	12.7	38.69	42.31	12.7	61.66	20.01	12.8	19.52	8.43	12.8	56.15	55.42
13.7	34.35	13.17	13.7	39.15	42.36	13.7	61.93	20.07	13.8	19.66	8.32	13.8	56.32	55.28
14.7	34.57	13.36	14.7	39.58	42.41	14.7	62.22	20.15	14.8	19.80	8.23	14.8	56.49	55.15
15.7	34.80	13.60	15.7	40.00	42.43	15.7	62.51	20.23	15.8	19.94	8.13	15.8	56.68	55.05
16.7	35.02	13.86	16.7	40.46	42.43	16.7	62.80	20.37	16.8	20.07	8.00	16.8	56.87	54.99
17.7	35.22	14.12	17.7	40.92	42.43	17.7	63.08	20.53	17.8	20.22	7.87	17.8	57.06	54.93
18.7	35.42	14.38	18.7	41.43	42.43	18.7	63.35	20.70	18.8	20.36	7.72	18.8	57.25	54.90
19.7	35.60	14.64	19.7	41.95	42.43	19.7	63.59	20.86	19.8	20.53	7.56	19.8	57.42	54.89
20.7	35.77	14.88	20.7	42.49	42.47	20.7	63.83	21.01	20.8	20.69	7.42	20.8	57.58	54.86
21.7	35.93	15.12	21.7	43.04	42.54	21.7	64.05	21.14	21.8	20.86	7.32	21.8	57.73	54.83
22.7	36.09	15.32	22.7	43.56	42.64	22.7	64.27	21.26	22.8	21.04	7.25	22.8	57.88	54.78
23.7	36.27	15.52	23.7	44.06	42.77	23.7	64.51	21.37	23.8	21.20	7.20	23.8	58.02	54.71
24.7	36.46	15.72	24.7	44.53	42.90	24.7	64.75	21.47	24.8	21.36	7.16	24.8	58.17	54.62
25.7	36.65	15.94	25.7	44.96	43.03	25.7	65.01	21.55	25.8	21.51	7.16	25.8	58.34	54.54
26.7	36.86	16.16	26.7	45.38	43.16	26.7	65.28	21.67	26.8	21.66	7.16	26.8	58.52	54.45
27.7	37.06	16.41	27.7	45.78	43.28	27.7	65.55	21.80	27.8	21.81	7.12	27.8	58.71	54.40
28.7	37.27	16.69	28.7	46.19	43.38	28.7	65.83	21.97	28.8	21.96	7.09	28.8	58.90	54.37
29.6	37.46	16.98	29.7	46.60	43.48	29.7	66.10	22.16	29.8	22.11	7.06	29.8	59.08	54.36
30.6	37.64	17.29	30.7	47.05	43.58	30.7	66.36	22.35	30.8	22.27	7.02	30.8	59.27	54.37
31.6	37.81	17.59	31.7	47.51	43.69	31.7	66.60	22.56	31.8	22.44	6.97	31.8	59.45	54.38
8.55	−8.50		23.35	+23.32		9.88	−9.83		7.34	+7.27		6.24	−6.16	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
−83° 17' 21''.03			+87° 33' 10''.52			−84° 11' 30''.39			+82° 10' 32''.75			−80° 47' 6''.56		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m s	° ' "	Feb.	h m s	° ' "	Feb.	h m s	° ' "	Feb.	h m s	° ' "	Feb.	h m s	° ' "
0.9	17 58	+86 36	0.9	18 6	-87 39	0.9	19 0	+89 0	0.9	19 26	-89 13	0.9	20 48	+82 13
1.9	35.82	35.26	1.9	2.23	42.49	1.9	55.64	53.50	1.9	56.28	21.99	1.0	28.03	33.63
2.9	36.01	35.01	2.9	2.79	42.25	2.9	55.97	53.22	2.9	57.39	21.64	1.9	28.02	33.31
3.9	36.20	34.74	3.9	3.35	42.03	3.9	56.32	52.93	3.9	58.56	21.30	2.9	28.00	32.99
4.9	36.42	34.46	4.9	3.90	41.83	4.9	56.71	52.61	4.9	59.74	20.98	3.9	27.99	32.66
5.9	36.64	34.18	5.9	4.42	41.63	5.9	57.14	52.28	5.9	60.91	20.70	4.9	27.98	32.32
6.9	36.88	33.91	6.9	4.95	41.44	6.9	57.63	51.95	6.9	62.05	20.42	5.9	27.97	31.98
7.9	37.15	33.64	7.9	5.46	41.27	7.9	58.21	51.63	7.9	63.14	20.14	6.9	27.97	31.61
8.9	37.42	33.39	8.9	5.94	41.09	8.9	58.85	51.33	8.9	64.19	19.86	7.9	27.98	31.25
9.9	37.72	33.14	9.9	6.42	40.90	9.9	59.57	51.03	9.9	65.20	19.58	8.9	28.00	30.89
10.9	38.02	32.91	10.9	6.89	40.71	10.9	60.34	50.75	10.9	66.18	19.30	9.9	28.03	30.54
11.9	38.32	32.71	11.9	7.37	40.48	11.9	61.15	50.48	11.9	67.17	18.99	10.9	28.07	30.20
12.9	38.62	32.52	12.9	7.87	40.26	12.9	61.95	50.24	12.9	68.19	18.67	11.9	28.11	29.87
13.8	38.92	32.34	13.8	8.40	40.04	13.8	62.74	50.00	13.8	69.28	18.34	12.9	28.15	29.58
14.8	39.20	32.19	14.8	8.97	39.82	14.8	63.47	49.79	14.8	70.48	18.00	13.8	28.20	29.29
15.8	39.47	32.05	15.8	9.58	39.59	15.8	64.16	49.58	15.8	71.81	17.67	14.8	28.23	29.02
16.8	39.72	31.86	16.8	10.23	39.39	16.8	64.78	49.35	16.8	73.26	17.35	15.8	28.27	28.75
17.8	39.96	31.68	17.8	10.88	39.21	17.8	65.38	49.11	17.8	74.82	17.07	16.8	28.30	28.47
18.8	40.22	31.48	18.8	11.55	39.07	18.8	65.97	48.86	18.8	76.42	16.79	17.8	28.33	28.15
19.8	40.49	31.25	19.8	12.21	38.94	19.8	66.62	48.59	19.8	78.01	16.54	18.8	28.35	27.84
20.8	40.79	31.02	20.8	12.82	38.84	20.8	67.35	48.32	20.8	79.53	16.31	19.8	28.38	27.50
21.8	41.11	30.82	21.8	13.40	38.73	21.8	68.19	48.04	21.8	80.97	16.09	20.8	28.42	27.15
22.8	41.45	30.62	22.8	13.96	38.60	22.8	69.13	47.79	22.8	82.30	15.86	21.8	28.47	26.80
23.8	41.81	30.47	23.8	14.48	38.47	23.8	70.14	47.54	23.8	83.57	15.61	22.8	28.52	26.46
24.8	42.17	30.33	24.8	15.03	38.33	24.8	71.17	47.33	24.8	84.82	15.34	23.8	28.60	26.16
25.8	42.51	30.23	25.8	15.58	38.15	25.8	72.22	47.14	25.8	86.10	15.07	24.8	28.69	25.88
26.8	42.86	30.14	26.8	16.18	37.97	26.8	73.24	46.97	26.8	87.45	14.77	25.8	28.77	25.61
27.8	43.18	30.05	27.8	16.80	37.80	27.8	74.20	46.81	27.8	88.91	14.48	26.8	28.85	25.37
28.8	43.49	29.96	28.8	17.46	37.65	28.8	75.11	46.64	28.8	90.49	14.20	27.8	28.93	25.13
29.8	43.80	29.86	29.8	18.14	37.50	29.8	76.00	46.48	29.8	92.15	13.92	28.8	29.01	24.88
30.8	44.11	29.76	30.8	18.83	37.39	30.8	76.87	46.31	30.8	93.86	13.68	29.8	29.07	24.61
31.8	44.42	29.62	31.8	19.50	37.31	31.8	77.75	46.12	31.8	95.59	13.46	30.8	29.14	24.34
	44.74	29.49		20.16	37.25		78.67	45.92		97.30	13.26	31.8	29.21	24.05
16.91 +16.88			24.50 -24.48			58.10 +58.09			73.60 -73.59			7.39 +7.32		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 21 38	° ' " -83 5	Feb.	h m 22 15	° ' " -86 23	Feb.	h m 22 37	° ' " -81 48	Feb.	h m 23 27	° ' " +86 51	Feb.	h m 23 47	° ' " -82 28
	s "	"		s "	"		s "	"		s "	"		s "	"
1.0	14.37	67.15	1.1	57.70	28.93	1.1	34.98	65.55	1.1	22.72	19.98	1.1	12.58	54.81
2.0	14.38	66.76	2.1	57.64	28.52	2.1	34.94	65.17	2.1	22.46	19.78	2.1	12.48	54.48
3.0	14.41	66.37	3.1	57.60	28.14	3.1	34.92	64.78	3.1	22.19	19.59	3.1	12.39	54.16
4.0	14.44	66.00	4.1	57.58	27.76	4.1	34.90	64.42	4.1	21.91	19.36	4.1	12.31	53.84
5.0	14.47	65.64	5.1	57.57	27.38	5.1	34.88	64.05	5.1	21.62	19.12	5.1	12.24	53.52
6.0	14.50	65.30	6.0	57.56	27.02	6.1	34.87	63.73	6.1	21.33	18.88	6.1	12.17	53.21
7.0	14.53	64.96	7.0	57.53	26.68	7.1	34.84	63.40	7.1	21.05	18.60	7.1	12.09	52.92
8.0	14.54	64.63	8.0	57.50	26.34	8.1	34.81	63.08	8.1	20.78	18.33	8.1	12.01	52.63
9.0	14.55	64.31	9.0	57.47	26.01	9.1	34.79	62.76	9.1	20.55	18.04	9.1	11.94	52.34
10.0	14.56	63.97	10.0	57.42	25.67	10.1	34.75	62.44	10.1	20.34	17.73	10.1	11.84	52.04
11.0	14.57	63.63	11.0	57.36	25.31	11.1	34.71	62.09	11.1	20.15	17.41	11.1	11.74	51.75
12.0	14.57	63.26	12.0	57.30	24.93	12.0	34.67	61.73	12.1	19.98	17.13	12.1	11.65	51.43
13.0	14.58	62.86	13.0	57.24	24.53	13.0	34.62	61.36	13.1	19.84	16.86	13.1	11.55	51.12
14.0	14.61	62.46	14.0	57.20	24.12	14.0	34.61	60.96	14.1	19.70	16.61	14.1	11.46	50.76
14.9	14.64	62.04	15.0	57.19	23.70	15.0	34.59	60.55	15.1	19.57	16.36	15.1	11.37	50.38
15.9	14.69	61.63	16.0	57.20	23.27	16.0	34.58	60.14	16.1	19.40	16.12	16.1	11.31	49.99
16.9	14.77	61.22	17.0	57.26	22.84	17.0	34.59	59.72	17.1	19.23	15.89	17.1	11.25	49.59
17.9	14.85	60.81	18.0	57.35	22.42	18.0	34.62	59.30	18.1	19.04	15.66	18.1	11.20	49.20
18.9	14.94	60.44	19.0	57.43	22.05	19.0	34.65	58.93	19.1	18.81	15.39	19.1	11.17	48.83
19.9	15.03	60.09	20.0	57.52	21.66	20.0	34.67	58.54	20.1	18.61	15.11	20.1	11.14	48.45
20.9	15.10	59.75	21.0	57.58	21.30	21.0	34.68	58.20	21.1	18.42	14.79	21.1	11.11	48.11
21.9	15.16	59.42	22.0	57.63	20.96	22.0	34.69	57.86	22.1	18.24	14.45	22.1	11.06	47.78
22.9	15.20	59.08	23.0	57.65	20.62	23.0	34.69	57.51	23.1	18.11	14.11	23.1	11.00	47.44
23.9	15.24	58.71	23.9	57.66	20.25	24.0	34.68	57.15	24.0	18.03	13.79	24.1	10.94	47.10
24.9	15.28	58.35	24.9	57.67	19.87	25.0	34.67	56.79	25.0	17.97	13.47	25.1	10.86	46.77
25.9	15.34	57.97	25.9	57.70	19.47	26.0	34.67	56.38	26.0	17.92	13.15	26.1	10.78	46.40
26.9	15.39	57.57	26.9	57.73	19.06	27.0	34.66	55.98	27.0	17.87	12.88	27.1	10.73	46.01
27.9	15.47	57.16	27.9	57.78	18.65	28.0	34.67	55.57	28.0	17.82	12.60	28.1	10.68	45.60
28.9	15.56	56.76	28.9	57.87	18.22	29.0	34.70	55.15	29.0	17.75	12.33	29.0	10.64	45.19
29.9	15.65	56.38	29.9	57.99	17.79	29.9	34.73	54.74	30.0	17.67	12.05	30.0	10.61	44.78
30.9	15.75	56.02	30.9	58.12	17.39	30.9	34.78	54.34	31.0	17.58	11.77	31.0	10.60	44.37
31.9	15.87	55.65	31.9	58.25	17.01	31.9	34.83	53.95	32.0	17.48	11.46	32.0	10.59	43.99
8.32      -8.26			15.88    -15.85			7.03      -6.95			18.22    +18.20			7.64      -7.58		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
Mar.	0 56	+85 48	Mar.	1 29	+88 51	Mar.	1 41	-85 11	Mar.	4 10	+85 20	Mar.	5 35	+85 9
0.1	56.37	66.52	0.1	32.33	67.24	0.1	52.48	25.59	0.2	8.74	36.00	0.3	26.04	52.00
1.1	56.24	66.29	1.1	31.69	67.02	1.1	52.27	25.26	1.2	8.53	35.98	1.3	25.83	52.08
2.1	56.09	66.05	2.1	31.00	66.82	2.1	52.07	24.93	2.2	8.30	35.95	2.3	25.63	52.16
3.1	55.92	65.80	3.1	30.27	66.61	3.1	51.88	24.60	3.2	8.07	35.94	3.3	25.40	52.26
4.1	55.75	65.56	4.1	29.51	66.39	4.1	51.71	24.26	4.2	7.82	35.93	4.3	25.18	52.35
5.1	55.58	65.29	5.1	28.72	66.16	5.1	51.55	23.94	5.2	7.55	35.89	5.3	24.94	52.44
6.1	55.40	65.03	6.1	27.93	65.92	6.1	51.40	23.64	6.2	7.27	35.85	6.3	24.67	52.53
7.1	55.22	64.74	7.1	27.18	65.65	7.1	51.25	23.34	7.2	7.00	35.79	7.3	24.41	52.58
8.1	55.07	64.42	8.1	26.45	65.36	8.1	51.08	23.06	8.2	6.71	35.71	8.3	24.14	52.64
9.1	54.93	64.11	9.1	25.79	65.07	9.1	50.91	22.76	9.2	6.44	35.62	9.3	23.86	52.69
10.1	54.82	63.78	10.1	25.19	64.78	10.1	50.74	22.47	10.2	6.17	35.49	10.3	23.59	52.68
11.1	54.72	63.44	11.1	24.69	64.46	11.1	50.55	22.18	11.2	5.92	35.35	11.3	23.32	52.67
12.1	54.63	63.13	12.1	24.25	64.17	12.1	50.37	21.90	12.2	5.68	35.20	12.3	23.06	52.63
13.1	54.58	62.83	13.1	23.86	63.89	13.1	50.18	21.60	13.2	5.46	35.06	13.3	22.83	52.59
14.1	54.53	62.54	14.1	23.50	63.61	14.1	49.99	21.25	14.2	5.27	34.92	14.3	22.62	52.55
15.1	54.48	62.27	15.1	23.14	63.36	15.1	49.80	20.90	15.2	5.07	34.81	15.3	22.42	52.53
16.1	54.40	62.03	16.1	22.75	63.11	16.1	49.65	20.52	16.2	4.88	34.70	16.2	22.21	52.52
17.1	54.32	61.77	17.1	22.30	62.89	17.1	49.51	20.13	17.2	4.68	34.60	17.2	22.01	52.53
18.1	54.22	61.52	18.1	21.78	62.66	18.1	49.40	19.73	18.2	4.45	34.51	18.2	21.79	52.57
19.0	54.12	61.26	19.1	21.23	62.40	19.1	49.29	19.36	19.2	4.23	34.42	19.2	21.55	52.60
20.0	54.01	60.96	20.1	20.69	62.13	20.1	49.18	19.00	20.2	3.98	34.32	20.2	21.29	52.61
21.0	53.91	60.63	21.1	20.18	61.82	21.1	49.07	18.64	21.2	3.73	34.19	21.2	21.01	52.58
22.0	53.85	60.29	22.1	19.73	61.48	22.1	48.96	18.33	22.2	3.47	34.01	22.2	20.74	52.53
23.0	53.79	59.92	23.1	19.40	61.14	23.1	48.83	18.00	23.2	3.22	33.78	23.2	20.47	52.44
24.0	53.78	59.58	24.1	19.15	60.79	24.1	48.68	17.69	24.2	3.01	33.57	24.2	20.23	52.34
25.0	53.77	59.25	25.1	19.00	60.45	25.1	48.54	17.38	25.2	2.81	33.35	25.2	19.98	52.23
26.0	53.78	58.93	26.1	18.89	60.13	26.1	48.39	17.04	26.2	2.63	33.15	26.2	19.75	52.11
27.0	53.79	58.65	27.1	18.79	59.85	27.1	48.24	16.66	27.2	2.46	32.94	27.2	19.56	52.00
28.0	53.82	58.37	28.0	18.67	59.58	28.1	48.10	16.27	28.2	2.29	32.76	28.2	19.35	51.90
29.0	53.83	58.09	29.0	18.51	59.30	29.1	48.01	15.88	29.2	2.13	32.58	29.2	19.15	51.81
30.0	53.82	57.81	30.0	18.31	59.03	30.0	47.91	15.47	30.2	1.96	32.43	30.2	18.95	51.76
31.0	53.79	57.53	31.0	18.08	58.77	31.0	47.85	15.07	31.2	1.77	32.26	31.2	18.72	51.69
13.71 +13.67			50.60 +50.59			11.92 -11.88			12.32 +12.28			11.86 +11.82		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Ootantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 5 46	° ' " -84 50	Mar.	h m 6 46	° ' " -80 43	Mar.	h m 7 2	° ' " +87 11	Mar.	h m 7 13	° ' " +82 34	Mar.	h m 7 16	° ' " -86 54
	s	"		s	"		s	"		s	"		s	"
0.3	13.43	1.76	0.3	60.13	54.00	0.4	35.56	9.73	0.4	55.60	43.28	0.4	24.11	21.82
1.3	13.14	1.87	1.3	59.98	54.20	1.4	35.27	9.90	1.4	55.49	43.45	1.4	23.68	22.06
2.3	12.84	1.93	2.3	59.83	54.39	2.3	34.98	10.08	2.4	55.40	43.64	2.4	23.24	22.30
3.3	12.54	1.99	3.3	59.69	54.54	3.3	34.67	10.26	3.4	55.29	43.84	3.4	22.81	22.49
4.3	12.26	2.02	4.3	59.54	54.69	4.3	34.35	10.46	4.4	55.17	44.05	4.4	22.39	22.68
5.3	11.97	2.05	5.3	59.40	54.83	5.3	34.01	10.66	5.3	55.05	44.25	5.3	21.96	22.85
6.3	11.70	2.08	6.3	59.26	54.95	6.3	33.64	10.86	6.3	54.92	44.45	6.3	21.55	23.01
7.3	11.44	2.11	7.3	59.11	55.08	7.3	33.23	11.06	7.3	54.78	44.66	7.3	21.15	23.18
8.3	11.17	2.14	8.3	58.98	55.20	8.3	32.82	11.24	8.3	54.63	44.85	8.3	20.76	23.35
9.3	10.91	2.18	9.3	58.84	55.33	9.3	32.39	11.39	9.3	54.47	45.01	9.3	20.38	23.53
10.3	10.64	2.23	10.3	58.70	55.49	10.3	31.96	11.53	10.3	54.31	45.16	10.3	20.01	23.72
11.3	10.38	2.32	11.3	58.56	55.64	11.3	31.53	11.65	11.3	54.15	45.31	11.3	19.62	23.92
12.3	10.10	2.38	12.3	58.43	55.80	12.3	31.11	11.75	12.3	53.99	45.41	12.3	19.21	24.13
13.3	9.81	2.45	13.3	58.28	55.96	13.3	30.72	11.82	13.3	53.85	45.50	13.3	18.79	24.34
14.3	9.51	2.50	14.3	58.13	56.12	14.3	30.35	11.89	14.3	53.72	45.59	14.3	18.35	24.55
15.3	9.20	2.52	15.3	57.97	56.27	15.3	30.01	11.97	15.3	53.59	45.68	15.3	17.88	24.75
16.3	8.88	2.53	16.3	57.81	56.38	16.3	29.68	12.07	16.3	53.48	45.79	16.3	17.39	24.91
17.3	8.57	2.51	17.3	57.65	56.47	17.3	29.35	12.18	17.3	53.36	45.91	17.3	16.89	25.06
18.3	8.28	2.47	18.3	57.49	56.53	18.3	29.00	12.30	18.3	53.24	46.04	18.3	16.40	25.18
19.2	7.99	2.41	19.3	57.33	56.59	19.3	28.64	12.43	19.3	53.11	46.18	19.3	15.93	25.28
20.2	7.71	2.35	20.3	57.17	56.63	20.3	28.22	12.56	20.3	52.96	46.32	20.3	15.47	25.37
21.2	7.45	2.31	21.3	57.02	56.68	21.3	27.77	12.67	21.3	52.79	46.44	21.3	15.04	25.47
22.2	7.18	2.28	22.3	56.88	56.74	22.3	27.31	12.75	22.3	52.62	46.54	22.3	14.63	25.58
23.2	6.92	2.27	23.3	56.74	56.83	23.3	26.84	12.81	23.3	52.44	46.60	23.3	14.22	25.71
24.2	6.64	2.28	24.3	56.59	56.94	24.3	26.37	12.84	24.3	52.27	46.65	24.3	13.80	25.85
25.2	6.37	2.28	25.3	56.45	57.04	25.3	25.94	12.85	25.3	52.11	46.68	25.3	13.37	26.01
26.2	6.08	2.29	26.3	56.30	57.15	26.3	25.52	12.83	26.3	51.96	46.71	26.3	12.92	26.16
27.2	5.79	2.28	27.3	56.13	57.24	27.3	25.13	12.82	27.3	51.81	46.72	27.3	12.45	26.30
28.2	5.47	2.24	28.3	55.97	57.30	28.3	24.76	12.84	28.3	51.68	46.75	28.3	11.96	26.43
29.2	5.18	2.19	29.3	55.81	57.35	29.3	24.39	12.87	29.3	51.54	46.78	29.3	11.46	26.53
30.2	4.89	2.11	30.3	55.64	57.37	30.3	24.02	12.90	30.3	51.41	46.82	30.3	10.97	26.61
31.2	4.60	2.01	31.3	55.48	57.38	31.3	23.63	12.94	31.3	51.27	46.88	31.3	10.47	26.67
11.11 -11.06			6.21 -6.13			20.37 +20.35			7.74 +7.68			18.53 -18.51		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			♄ Chamæleontis. Mag. 5.2			80 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 8 16	° ' " +88 53	Mar.	h m 9 9	° ' " -85 20	Mar.	h m 9 25	° ' " +81 41	Mar.	h m 9 36	° ' " -80 34	Mar.	h m 10 21	° ' " +82 58
	s	"		s	"		s	"		s	"		s	"
0.4	78.41	7.70	0.4	6.50	10.20	0.5	35.65	39.94	0.5	27.98	19.08	0.5	20.55	46.29
1.4	77.89	7.94	1.4	6.35	10.58	1.5	35.62	40.19	1.5	27.94	19.48	1.5	20.55	46.56
2.4	77.38	8.21	2.4	6.18	10.95	2.5	35.60	40.47	2.5	27.88	19.86	2.5	20.57	46.84
3.4	76.87	8.46	3.4	6.01	11.29	3.4	35.58	40.75	3.5	27.82	20.24	3.5	20.58	47.15
4.4	76.30	8.73	4.4	5.82	11.62	4.4	35.56	41.06	4.5	27.75	20.60	4.5	20.58	47.46
5.4	75.68	9.02	5.4	5.65	11.93	5.4	35.52	41.37	5.4	27.68	20.93	5.5	20.59	47.77
6.4	75.01	9.30	6.4	5.48	12.23	6.4	35.48	41.69	6.4	27.61	21.26	6.5	20.57	48.11
7.4	74.28	9.57	7.4	5.30	12.52	7.4	35.42	42.00	7.4	27.54	21.59	7.5	20.54	48.44
8.4	73.47	9.82	8.4	5.15	12.81	8.4	35.35	42.31	8.4	27.48	21.90	8.5	20.52	48.78
9.4	72.60	10.07	9.4	5.00	13.12	9.4	35.27	42.60	9.4	27.41	22.21	9.5	20.47	49.12
10.4	71.71	10.30	10.4	4.84	13.44	10.4	35.19	42.89	10.4	27.35	22.54	10.5	20.41	49.44
11.4	70.79	10.49	11.4	4.69	13.77	11.4	35.10	43.17	11.4	27.30	22.91	11.5	20.34	49.76
12.4	69.88	10.68	12.4	4.54	14.12	12.4	35.01	43.42	12.4	27.25	23.28	12.5	20.28	50.04
13.4	69.02	10.85	13.4	4.38	14.48	13.4	34.93	43.65	13.4	27.18	23.65	13.5	20.22	50.32
14.4	68.22	10.99	14.4	4.20	14.84	14.4	34.86	43.86	14.4	27.11	24.04	14.5	20.16	50.56
15.4	67.46	11.16	15.4	4.01	15.18	15.4	34.80	44.09	15.4	27.03	24.42	15.5	20.11	50.81
16.4	66.79	11.34	16.4	3.79	15.52	16.4	34.75	44.32	16.4	26.96	24.79	16.4	20.07	51.06
17.4	66.11	11.53	17.4	3.56	15.84	17.4	34.69	44.55	17.4	26.87	25.13	17.4	20.04	51.32
18.4	65.41	11.73	18.4	3.32	16.12	18.4	34.64	44.81	18.4	26.77	25.45	18.4	20.01	51.60
19.4	64.64	11.95	19.4	3.09	16.39	19.4	34.57	45.09	19.4	26.67	25.74	19.4	19.98	51.92
20.4	63.79	12.17	20.4	2.85	16.65	20.4	34.49	45.36	20.4	26.57	26.02	20.4	19.93	52.23
21.3	62.83	12.40	21.4	2.64	16.90	21.4	34.40	45.61	21.4	26.48	26.29	21.4	19.85	52.54
22.3	61.82	12.58	22.4	2.44	17.16	22.4	34.30	45.89	22.4	26.40	26.58	22.4	19.77	52.84
23.3	60.74	12.74	23.4	2.25	17.42	23.4	34.18	46.13	23.4	26.32	26.86	23.4	19.67	53.13
24.3	59.66	12.88	24.4	2.07	17.73	24.4	34.05	46.35	24.4	26.24	27.18	24.4	19.56	53.42
25.3	58.61	12.97	25.4	1.88	18.04	25.4	33.95	46.55	25.4	26.17	27.51	25.4	19.46	53.67
26.3	57.61	13.07	26.4	1.69	18.35	26.4	33.84	46.73	26.4	26.09	27.85	26.4	19.35	53.91
27.3	56.66	13.16	27.4	1.47	18.65	27.4	33.74	46.90	27.4	26.00	28.18	27.4	19.26	54.13
28.3	55.76	13.26	28.4	1.23	18.94	28.4	33.65	47.06	28.4	25.91	28.51	28.4	19.17	54.35
29.3	54.88	13.38	29.4	0.99	19.22	29.4	33.55	47.24	29.4	25.81	28.81	29.4	19.09	54.57
30.3	54.01	13.50	30.4	0.72	19.49	30.4	33.47	47.43	30.4	25.70	29.10	30.4	19.02	54.82
31.3	53.12	13.62	31.4	0.46	19.72	31.4	33.38	47.63	31.4	25.59	29.37	31.4	18.94	55.08
51.46	+51.45		12.30	-12.26		6.92	+6.85		6.11	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Mar.	11 0	−84 8	Mar.	12 15	+88 9	Mar.	12 46	−84 40	Mar.	12 48	+83 51	Mar.	13 27	−85 21
	s	"		s	"		s	"		s	"		s	"
0.5	5.49	58.18	0.6	10.68	17.45	0.6	19.40	23.32	0.6	42.40	28.62	0.6	28.27	40.47
1.5	5.50	58.61	1.6	10.96	17.71	1.6	19.55	23.70	1.6	42.51	28.84	1.6	28.50	40.79
2.5	5.49	59.04	2.6	11.27	17.97	2.6	19.69	24.09	2.6	42.64	29.07	2.6	28.70	41.16
3.5	5.48	59.46	3.6	11.58	18.23	3.6	19.79	24.49	3.6	42.77	29.31	3.6	28.88	41.50
4.5	5.45	59.85	4.6	11.89	18.50	4.6	19.90	24.86	4.6	42.89	29.57	4.6	29.06	41.85
5.5	5.42	60.23	5.6	12.21	18.80	5.6	20.00	25.22	5.6	43.01	29.84	5.6	29.21	42.19
6.5	5.39	60.61	6.6	12.49	19.11	6.6	20.08	25.57	6.6	43.12	30.12	6.6	29.35	42.53
7.5	5.36	60.97	7.6	12.74	19.43	7.6	20.17	25.91	7.6	43.23	30.43	7.6	29.51	42.84
8.5	5.35	61.32	8.5	12.95	19.76	8.6	20.26	26.25	8.6	43.32	30.75	8.6	29.66	43.14
9.5	5.33	61.69	9.5	13.13	20.10	9.6	20.36	26.58	9.6	43.40	31.08	9.6	29.81	43.44
10.5	5.33	62.05	10.5	13.25	20.46	10.6	20.47	26.91	10.6	43.47	31.40	10.6	29.98	43.73
11.5	5.32	62.42	11.5	13.35	20.79	11.6	20.60	27.27	11.6	43.53	31.72	11.6	30.18	44.04
12.5	5.31	62.83	12.5	13.39	21.11	12.6	20.72	27.63	12.6	43.58	32.02	12.6	30.37	44.36
13.5	5.31	63.24	13.5	13.44	21.41	13.6	20.84	28.00	13.6	43.63	32.31	13.6	30.57	44.72
14.5	5.30	63.66	14.5	13.48	21.69	14.6	20.96	28.39	14.6	43.68	32.60	14.6	30.77	45.08
15.5	5.26	64.08	15.5	13.57	21.97	15.6	21.07	28.81	15.6	43.73	32.84	15.6	30.95	45.47
16.5	5.22	64.51	16.5	13.67	22.25	16.5	21.17	29.23	16.5	43.79	33.10	16.6	31.10	45.86
17.5	5.15	64.94	17.5	13.81	22.51	17.5	21.23	29.66	17.5	43.88	33.35	17.6	31.24	46.26
18.5	5.07	65.34	18.5	13.98	22.79	18.5	21.29	30.05	18.5	43.96	33.62	18.6	31.36	46.65
19.5	4.99	65.72	19.5	14.14	23.11	19.5	21.33	30.44	19.5	44.03	33.91	19.6	31.47	47.03
20.5	4.91	66.06	20.5	14.26	23.43	20.5	21.36	30.82	20.5	44.09	34.23	20.6	31.56	47.39
21.5	4.85	66.41	21.5	14.33	23.77	21.5	21.40	31.18	21.5	44.15	34.56	21.6	31.65	47.73
22.5	4.79	66.75	22.5	14.34	24.11	22.5	21.45	31.52	22.5	44.19	34.91	22.6	31.76	48.07
23.5	4.73	67.11	23.5	14.29	24.48	23.5	21.51	31.87	23.5	44.20	35.26	23.6	31.89	48.40
24.5	4.69	67.47	24.5	14.19	24.82	24.5	21.60	32.23	24.5	44.21	35.60	24.6	32.03	48.73
25.5	4.65	67.83	25.5	14.06	25.14	25.5	21.68	32.61	25.5	44.21	35.93	25.6	32.18	49.08
26.4	4.61	68.22	26.5	13.94	25.43	26.5	21.77	33.00	26.5	44.20	36.23	26.5	32.33	49.44
27.4	4.56	68.62	27.5	13.83	25.72	27.5	21.84	33.41	27.5	44.20	36.52	27.5	32.48	49.83
28.4	4.48	69.01	28.5	13.74	26.01	28.5	21.90	33.82	28.5	44.20	36.81	28.5	32.61	50.22
29.4	4.40	69.41	29.5	13.68	26.29	29.5	21.95	34.23	29.5	44.22	37.10	29.5	32.71	50.63
30.4	4.29	69.80	30.5	13.63	26.56	30.5	21.96	34.65	30.5	44.24	37.37	30.5	32.81	51.04
31.4	4.19	70.16	31.5	13.59	26.87	31.5	21.97	35.04	31.5	44.26	37.66	31.5	32.87	51.43
9.81	−9.76		31.08	+31.06		10.77	−10.73		9.35	+9.29		12.37	−12.33	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
−84° 8' 50".60			+88° 9' 36".08			−84° 40' 22".34			+83° 51' 50".47			−85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 14 13	° ' " -83 17	Mar.	h m 15 3	° ' " +87 32	Mar.	h m 15 24	° ' " -84 11	Mar.	h m 16 54	° ' " +82 10	Mar.	h m 17 15	° ' " -80 46
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	37.27	16.69	0.7	46.19	43.38	0.7	5.83	21.97	0.8	21.96	7.09	0.8	58.90	54.37
1.6	37.46	16.98	1.7	46.60	43.48	1.7	6.10	22.16	1.8	22.11	7.06	1.8	59.08	54.36
2.6	37.64	17.29	2.7	47.05	43.58	2.7	6.36	22.35	2.8	22.27	7.02	2.8	59.27	54.37
3.6	37.81	17.59	3.7	47.51	43.69	3.7	6.60	22.56	3.8	22.44	6.97	3.8	59.45	54.38
4.6	37.96	17.88	4.7	47.98	43.81	4.7	6.83	22.77	4.8	22.60	6.93	4.8	59.62	54.42
5.6	38.10	18.19	5.7	48.48	43.94	5.7	7.05	22.97	5.8	22.77	6.88	5.8	59.78	54.45
6.6	38.25	18.47	6.7	48.96	44.09	6.7	7.25	23.18	6.7	22.94	6.87	6.8	59.95	54.49
7.6	38.38	18.75	7.7	49.45	44.25	7.7	7.46	23.37	7.7	23.11	6.86	7.8	60.09	54.52
8.6	38.53	19.02	8.7	49.93	44.43	8.7	7.67	23.55	8.7	23.28	6.87	8.8	60.24	54.53
9.6	38.67	19.27	9.7	50.38	44.62	9.7	7.88	23.71	9.7	23.45	6.91	9.8	60.39	54.54
10.6	38.81	19.52	10.7	50.81	44.84	10.7	8.09	23.87	10.7	23.62	6.97	10.8	60.54	54.53
11.6	38.99	19.78	11.7	51.20	45.06	11.7	8.32	24.04	11.7	23.77	7.05	11.7	60.71	54.52
12.6	39.15	20.05	12.7	51.56	45.28	12.7	8.56	24.21	12.7	23.92	7.13	12.7	60.88	54.51
13.6	39.32	20.33	13.7	51.90	45.49	13.7	8.81	24.40	13.7	24.07	7.22	13.7	61.06	54.50
14.6	39.50	20.65	14.6	52.22	45.69	14.7	9.07	24.62	14.7	24.22	7.30	14.7	61.25	54.50
15.6	39.68	20.98	15.6	52.56	45.87	15.7	9.33	24.85	15.7	24.37	7.35	15.7	61.43	54.55
16.6	39.83	21.34	16.6	52.90	46.02	16.7	9.57	25.12	16.7	24.50	7.40	16.7	61.63	54.62
17.6	39.97	21.70	17.6	53.27	46.18	17.7	9.80	25.40	17.7	24.66	7.43	17.7	61.81	54.70
18.6	40.11	22.06	18.6	53.68	46.35	18.7	10.00	25.68	18.7	24.80	7.46	18.7	61.99	54.80
19.6	40.21	22.40	19.6	54.09	46.52	19.7	10.20	25.94	19.7	24.98	7.50	19.7	62.16	54.91
20.6	40.32	22.74	20.6	54.50	46.73	20.6	10.38	26.20	20.7	25.14	7.56	20.7	62.31	55.02
21.6	40.42	23.04	21.6	54.89	46.96	21.6	10.56	26.44	21.7	25.30	7.65	21.7	62.45	55.10
22.6	40.53	23.34	22.6	55.27	47.24	22.6	10.75	26.66	22.7	25.47	7.77	22.7	62.60	55.15
23.6	40.66	23.62	23.6	55.60	47.52	23.6	10.93	26.85	23.7	25.61	7.91	23.7	62.74	55.20
24.6	40.80	23.92	24.6	55.89	47.80	24.6	11.16	27.06	24.7	25.76	8.09	24.7	62.91	55.24
25.6	40.94	24.23	25.6	56.16	48.07	25.6	11.37	27.29	25.7	25.91	8.26	25.7	63.08	55.28
26.6	41.09	24.54	26.6	56.40	48.34	26.6	11.60	27.53	26.7	26.05	8.43	26.7	63.26	55.33
27.6	41.24	24.89	27.6	56.64	48.59	27.6	11.82	27.79	27.7	26.17	8.57	27.7	63.44	55.41
28.6	41.37	25.25	28.6	56.90	48.82	28.6	12.05	28.06	28.7	26.31	8.72	28.7	63.62	55.50
29.6	41.50	25.62	29.6	57.17	49.06	29.6	12.25	28.35	29.7	26.44	8.84	29.7	63.81	55.62
30.6	41.60	25.99	30.6	57.43	49.28	30.6	12.45	28.65	30.7	26.58	8.96	30.7	63.98	55.75
31.6	41.70	26.36	31.6	57.73	49.51	31.6	12.62	28.96	31.7	26.72	9.09	31.7	64.14	55.89
8.56	-8.50		23.36	+23.33		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup>	27 <sup>s</sup> .793		15 <sup>h</sup> 3 <sup>m</sup>	41 <sup>s</sup> .175		15 <sup>h</sup> 23 <sup>m</sup>	56 <sup>s</sup> .594		16 <sup>h</sup> 54 <sup>m</sup>	25 <sup>s</sup> .488		17 <sup>h</sup> 15 <sup>m</sup>	54 <sup>s</sup> .896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Mar.	17 58	+86 36	Mar.	18 6	-87 39	Mar.	19 1	+89 0	Mar.	19 27	-89 13	Mar.	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
0.8	43.80	29.86	0.8	18.14	37.50	0.9	16.00	46.48	0.9	32.15	13.92	0.9	29.01	24.88
1.8	44.11	29.76	1.8	18.83	37.39	1.8	16.87	46.31	1.9	33.86	13.68	1.9	29.07	24.61
2.8	44.42	29.62	2.8	19.50	37.31	2.8	17.75	46.12	2.9	35.59	13.46	2.9	29.14	24.34
3.8	44.74	29.49	3.8	20.16	37.25	3.8	18.67	45.92	3.9	37.30	13.26	3.9	29.21	24.05
4.8	45.08	29.39	4.8	20.80	37.18	4.8	19.65	45.71	4.9	38.99	13.07	4.9	29.29	23.75
5.8	45.44	29.26	5.8	21.41	37.13	5.8	20.70	45.52	5.9	40.62	12.88	5.9	29.37	23.44
6.8	45.81	29.14	6.8	22.01	37.08	6.8	21.80	45.33	6.9	42.20	12.70	6.9	29.45	23.13
7.8	46.20	29.04	7.8	22.59	37.02	7.8	22.96	45.14	7.9	43.72	12.53	7.9	29.54	22.83
8.8	46.59	28.97	8.8	23.16	36.95	8.8	24.17	44.98	8.8	45.19	12.33	8.9	29.64	22.55
9.8	46.97	28.92	9.8	23.73	36.87	9.8	25.42	44.83	9.8	46.65	12.13	9.9	29.75	22.29
10.8	47.37	28.88	10.8	24.32	36.78	10.8	26.67	44.72	10.8	48.13	11.90	10.9	29.87	22.03
11.8	47.74	28.87	11.8	24.91	36.67	11.8	27.90	44.61	11.8	49.65	11.68	11.9	29.99	21.79
12.8	48.11	28.86	12.8	25.55	36.57	12.8	29.08	44.52	12.8	51.26	11.46	12.9	30.12	21.59
13.8	48.45	28.86	13.8	26.23	36.48	13.8	30.20	44.45	13.8	52.96	11.23	13.9	30.22	21.39
14.8	48.78	28.87	14.8	26.92	36.41	14.8	31.25	44.39	14.8	54.79	11.02	14.9	30.33	21.21
15.8	49.10	28.86	15.8	27.63	36.35	15.8	32.25	44.30	15.8	56.72	10.82	15.9	30.45	21.01
16.8	49.41	28.82	16.8	28.37	36.33	16.8	33.22	44.19	16.8	58.70	10.64	16.9	30.54	20.80
17.8	49.74	28.77	17.8	29.09	36.33	17.8	34.22	44.06	17.8	60.68	10.50	17.9	30.64	20.58
18.8	50.08	28.72	18.8	29.76	36.35	18.8	35.28	43.93	18.8	62.61	10.37	18.9	30.74	20.34
19.8	50.44	28.67	19.8	30.42	36.36	19.8	36.42	43.80	19.8	64.46	10.25	19.9	30.85	20.10
20.8	50.82	28.63	20.8	31.03	36.39	20.8	37.64	43.68	20.8	66.18	10.13	20.9	30.97	19.85
21.8	51.21	28.63	21.8	31.61	36.40	21.8	38.94	43.58	21.8	67.83	10.01	21.9	31.10	19.61
22.7	51.61	28.67	22.8	32.18	36.38	22.8	40.28	43.52	22.8	69.43	9.88	22.9	31.23	19.40
23.7	52.00	28.71	23.8	32.78	36.34	23.8	41.63	43.48	23.8	71.01	9.72	23.9	31.38	19.21
24.7	52.38	28.80	24.7	33.38	36.30	24.8	42.94	43.47	24.8	72.67	9.55	24.9	31.52	19.06
25.7	52.72	28.88	25.7	34.04	36.26	25.8	44.18	43.46	25.8	74.41	9.38	25.9	31.68	18.90
26.7	53.06	28.97	26.7	34.72	36.22	26.8	45.36	43.46	26.8	76.24	9.21	26.9	31.82	18.76
27.7	53.40	29.03	27.7	35.42	36.21	27.8	46.48	43.45	27.8	78.17	9.06	27.9	31.96	18.63
28.7	53.71	29.10	28.7	36.12	36.22	28.8	47.57	43.44	28.8	80.14	8.92	28.9	32.10	18.51
29.7	54.04	29.16	29.7	36.82	36.26	29.8	48.67	43.42	29.8	82.15	8.82	29.8	32.22	18.37
30.7	54.37	29.20	30.7	37.49	36.32	30.8	49.78	43.38	30.8	84.14	8.73	30.8	32.34	18.22
31.7	54.71	29.25	31.7	38.16	36.38	31.8	50.93	43.34	31.8	86.08	8.64	31.8	32.48	18.05
16.90	+16.87		24.49	-24.47		58.01	+58.00		73.43	-73.42		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1 <sup>s</sup> .307		18 <sup>h</sup> 6 <sup>m</sup>	11 <sup>s</sup> .893		19 <sup>h</sup> 2 <sup>m</sup>	39 <sup>s</sup> .624		19 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .218		20 <sup>h</sup> 48 <sup>m</sup>	40 <sup>s</sup> .494	
+86° 36'	51''.17		-87° 39'	51''.82		+89° 1'	2''.17		-89° 13'	28''.57		+82° 13'	29''.86	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

bridge 944.  
ag. 6.4

light con- tion.	Decli- nation.
h m	° ' "
5 35	+85 9
s	"
8.72	51.69
8.50	51.62
8.28	51.54
8.02	51.45
7.77	51.35
7.51	51.22
7.26	51.07
7.02	50.89
6.78	50.72
6.58	50.53
6.40	50.33
6.22	50.15
6.07	49.96
5.90	49.81
5.73	49.69
5.56	49.56
5.36	49.43
5.14	49.27
4.92	49.08
4.72	48.88
4.51	48.64
4.31	48.37
4.16	48.12
4.01	47.88
3.88	47.63
3.76	47.41
3.63	47.21
3 50	47.01
3.35	46.81
3.20	46.60
3.03	46.41
2.86	46.18

+11.82

15<sup>m</sup> 12<sup>s</sup>.782

9' 30".24

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 5 45	° ' " -84 49	Apr.	h m 6 46	° ' " -80 43	Apr.	h m 7 2	° ' " +87 11	Apr.	h m 7 13	° ' " +82 34	Apr.	h m 7 15	° ' " -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.2	64.60	62.01	0.3	55.48	57.38	0.3	23.63	12.94	0.3	51.27	46.88	0.3	70.47	26.67
1.2	64.32	61.91	1.3	55.33	57.38	1.3	23.22	12.98	1.3	51.12	46.94	1.3	69.99	26.70
2.2	64.06	61.78	2.3	55.18	57.36	2.3	22.78	13.02	2.3	50.96	47.00	2.3	69.53	26.73
3.2	63.80	61.67	3.3	55.03	57.34	3.3	22.34	13.05	3.3	50.79	47.05	3.3	69.08	26.77
4.2	63.55	61.56	4.2	54.88	57.32	4.3	21.89	13.08	4.3	50.62	47.10	4.3	68.64	26.81
5.2	63.30	61.46	5.2	54.74	57.32	5.3	21.42	13.08	5.3	50.45	47.11	5.3	68.21	26.84
6.2	63.05	61.36	6.2	54.60	57.32	6.3	20.94	13.05	6.3	50.27	47.10	6.3	67.79	26.89
7.2	62.80	61.31	7.2	54.45	57.33	7.3	20.47	13.01	7.3	50.09	47.07	7.3	67.37	26.94
8.2	62.53	61.24	8.2	54.30	57.37	8.2	20.01	12.94	8.3	49.91	47.03	8.3	66.93	27.02
9.2	62.27	61.17	9.2	54.16	57.40	9.2	19.58	12.85	9.3	49.75	46.98	9.3	66.49	27.10
10.2	62.00	61.09	10.2	54.01	57.42	10.2	19.19	12.76	10.3	49.60	46.90	10.3	66.03	27.18
11.2	61.71	60.99	11.2	53.86	57.43	11.2	18.81	12.68	11.2	49.47	46.83	11.2	65.53	27.24
12.2	61.43	60.86	12.2	53.70	57.42	12.2	18.46	12.61	12.2	49.33	46.77	12.2	65.03	27.29
13.2	61.14	60.72	13.2	53.55	57.38	13.2	18.12	12.55	13.2	49.21	46.73	13.2	64.52	27.32
14.2	60.87	60.53	14.2	53.39	57.30	14.2	17.77	12.50	14.2	49.09	46.71	14.2	64.01	27.33
15.2	60.60	60.35	15.2	53.23	57.21	15.2	17.41	12.47	15.2	48.95	46.70	15.2	63.51	27.29
16.2	60.36	60.16	16.2	53.08	57.11	16.2	17.01	12.43	16.2	48.80	46.69	16.2	63.04	27.25
17.2	60.13	59.98	17.2	52.93	57.01	17.2	16.59	12.38	17.2	48.64	46.66	17.2	62.60	27.21
18.2	59.90	59.81	18.2	52.79	56.94	18.2	16.14	12.31	18.2	48.47	46.62	18.2	62.17	27.18
19.2	59.68	59.66	19.2	52.65	56.88	19.2	15.68	12.23	19.2	48.31	46.54	19.2	61.75	27.17
20.2	59.44	59.52	20.2	52.51	56.84	20.2	15.23	12.10	20.2	48.13	46.42	20.2	61.35	27.17
21.2	59.21	59.39	21.2	52.36	56.81	21.2	14.81	11.93	21.2	47.97	46.29	21.2	60.93	27.17
22.2	58.97	59.27	22.2	52.23	56.77	22.2	14.42	11.75	22.2	47.82	46.16	22.2	60.48	27.18
23.2	58.72	59.14	23.2	52.08	56.72	23.2	14.06	11.60	23.2	47.68	46.01	23.2	60.02	27.19
24.2	58.45	59.00	24.2	51.93	56.66	24.2	13.72	11.46	24.2	47.56	45.86	24.2	59.55	27.18
25.1	58.20	58.81	25.2	51.78	56.57	25.2	13.39	11.32	25.2	47.44	45.75	25.2	59.08	27.16
26.1	57.96	58.62	26.2	51.63	56.46	26.2	13.07	11.19	26.2	47.32	45.64	26.2	58.59	27.11
27.1	57.71	58.39	27.2	51.49	56.33	27.2	12.74	11.08	27.2	47.20	45.54	27.2	58.11	27.04
28.1	57.48	58.16	28.2	51.34	56.18	28.2	12.41	10.97	28.2	47.07	45.44	28.2	57.65	26.95
29.1	57.26	57.92	29.2	51.20	56.03	29.2	12.05	10.86	29.2	46.94	45.35	29.2	57.20	26.86
30.1	57.06	57.69	30.2	51.07	55.89	30.2	11.67	10.74	30.2	46.80	45.26	30.2	56.77	26.77
31.1	56.86	57.46	31.2	50.93	55.74	31.2	11.29	10.61	31.2	46.66	45.14	31.2	56.36	26.66
11.10 -11.06			6.21 -6.13			20.37 +20.35			7.74 +7.68			18.54 -18.51		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 8 16	° ' +88 53	Apr.	h m 9 8	° ' −85 20	Apr.	h m 9 25	° ' +81 41	Apr.	h m 9 36	° ' −80 34	Apr.	h m 10 21	° ' +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.3	53.12	13.62	0.4	60.46	19.72	0.4	33.38	47.63	0.4	25.59	29.37	0.4	18.94	55.08
1.3	52.19	13.76	1.4	60.21	19.94	1.4	33.29	47.84	1.4	25.47	29.63	1.4	18.86	55.34
2.3	51.21	13.89	2.4	59.96	20.15	2.4	33.19	48.06	2.4	25.36	29.87	2.4	18.77	55.60
3.3	50.17	14.02	3.3	59.71	20.35	3.4	33.07	48.29	3.4	25.25	30.10	3.4	18.67	55.89
4.3	49.07	14.17	4.3	59.46	20.55	4.4	32.94	48.52	4.4	25.14	30.32	4.4	18.56	56.17
5.3	47.93	14.27	5.3	59.23	20.75	5.4	32.82	48.72	5.4	25.04	30.56	5.4	18.43	56.44
6.3	46.76	14.36	6.3	59.00	20.95	6.4	32.68	48.89	6.4	24.94	30.80	6.4	18.30	56.68
7.3	45.58	14.43	7.3	58.78	21.17	7.4	32.53	49.05	7.4	24.84	31.03	7.4	18.15	56.91
8.3	44.40	14.49	8.3	58.56	21.40	8.3	32.39	49.20	8.4	24.74	31.28	8.4	18.01	57.13
9.3	43.27	14.50	9.3	58.34	21.65	9.3	32.26	49.32	9.4	24.65	31.55	9.4	17.87	57.32
10.3	42.21	14.51	10.3	58.09	21.90	10.3	32.13	49.43	10.3	24.55	31.83	10.4	17.72	57.50
11.3	41.22	14.53	11.3	57.84	22.14	11.3	32.01	49.53	11.3	24.44	32.11	11.4	17.60	57.67
12.3	40.28	14.54	12.3	57.56	22.39	12.3	31.91	49.62	12.3	24.31	32.37	12.4	17.50	57.82
13.3	39.38	14.57	13.3	57.28	22.59	13.3	31.80	49.74	13.3	24.19	32.61	13.4	17.39	57.99
14.3	38.48	14.60	14.3	56.98	22.78	14.3	31.71	49.87	14.3	24.06	32.84	14.4	17.29	58.16
15.3	37.55	14.65	15.3	56.69	22.93	15.3	31.61	50.01	15.3	23.93	33.03	15.4	17.19	58.35
16.3	36.56	14.71	16.3	56.39	23.08	16.3	31.48	50.13	16.3	23.80	33.21	16.4	17.07	58.56
17.3	35.47	14.76	17.3	56.12	23.23	17.3	31.35	50.29	17.3	23.67	33.37	17.4	16.94	58.79
18.3	34.31	14.80	18.3	55.85	23.36	18.3	31.21	50.43	18.3	23.55	33.53	18.4	16.80	59.00
19.3	33.10	14.82	19.3	55.61	23.49	19.3	31.06	50.56	19.3	23.44	33.69	19.4	16.63	59.20
20.3	31.89	14.80	20.3	55.38	23.66	20.3	30.91	50.66	20.3	23.33	33.87	20.4	16.46	59.35
21.3	30.70	14.76	21.3	55.14	23.83	21.3	30.75	50.74	21.3	23.23	34.05	21.3	16.29	59.50
22.3	29.56	14.69	22.3	54.90	24.01	22.3	30.60	50.79	22.3	23.12	34.28	22.3	16.13	59.63
23.3	28.50	14.62	23.3	54.64	24.19	23.3	30.47	50.82	23.3	23.00	34.50	23.3	15.98	59.73
24.3	27.50	14.55	24.3	54.37	24.38	24.3	30.33	50.85	24.3	22.88	34.71	24.3	15.83	59.82
25.3	26.55	14.48	25.3	54.08	24.54	25.3	30.22	50.89	25.3	22.76	34.91	25.3	15.69	59.92
26.3	25.61	14.43	26.3	53.79	24.68	26.3	30.10	50.93	26.3	22.63	35.09	26.3	15.56	60.04
27.2	24.68	14.40	27.3	53.49	24.79	27.3	29.98	50.99	27.3	22.49	35.24	27.3	15.43	60.17
28.2	23.71	14.37	28.3	53.19	24.89	28.3	29.87	51.07	28.3	22.36	35.37	28.3	15.30	60.29
29.2	22.72	14.35	29.3	52.90	24.96	29.3	29.74	51.15	29.3	22.22	35.48	29.3	15.17	60.42
30.2	21.68	14.33	30.3	52.60	25.04	30.3	29.61	51.22	30.3	22.08	35.58	30.3	15.02	60.56
31.2	20.60	14.29	31.3	52.32	25.10	31.3	29.47	51.29	31.3	21.95	35.67	31.3	14.86	60.69
51.50 +51.49			12.31 −12.27			6.92 +6.85			6.11 −6.03			8.19 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			−85° 19' 57''.45			+81° 41' 41''.50			−80° 34' 6''.83			+82° 58' 54''.07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 11 0	° ' -84 9	Apr.	h m 12 15	° ' +88 9	Apr.	h m 12 46	° ' -84 40	Apr.	h m 12 48	° ' +83 51	Apr.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.4	4.19	10.16	0.5	13.59	26.87	0.5	21.97	35.04	0.5	44.26	37.66	0.5	32.87	51.43
1.4	4.08	10.50	1.5	13.57	27.18	1.5	21.98	35.43	1.5	44.28	37.97	1.5	32.93	51.81
2.4	3.97	10.83	2.5	13.51	27.51	2.5	21.98	35.80	2.5	44.30	38.30	2.5	32.98	52.18
3.4	3.85	11.16	3.5	13.44	27.84	3.5	21.97	36.16	3.5	44.31	38.63	3.5	33.02	52.54
4.4	3.74	11.48	4.5	13.31	28.17	4.5	21.97	36.52	4.5	44.31	38.97	4.5	33.07	52.89
5.4	3.64	11.79	5.5	13.14	28.51	5.5	21.96	36.87	5.5	44.29	39.32	5.5	33.12	53.22
6.4	3.54	12.10	6.5	12.94	28.85	6.5	21.97	37.21	6.5	44.26	39.67	6.5	33.17	53.55
7.4	3.46	12.40	7.5	12.69	29.18	7.5	21.99	37.54	7.5	44.22	40.02	7.5	33.26	53.89
8.4	3.37	12.73	8.5	12.41	29.49	8.5	22.02	37.90	8.5	44.17	40.36	8.5	33.34	54.24
9.4	3.29	13.09	9.5	12.11	29.78	9.5	22.05	38.28	9.5	44.11	40.68	9.5	33.42	54.60
10.4	3.20	13.45	10.5	11.81	30.05	10.5	22.08	38.68	10.5	44.05	40.96	10.5	33.51	54.98
11.4	3.10	13.81	11.5	11.53	30.32	11.5	22.09	39.09	11.5	43.99	41.24	11.5	33.60	55.39
12.4	2.97	14.17	12.5	11.28	30.56	12.5	22.10	39.50	12.5	43.95	41.51	12.5	33.66	55.80
13.4	2.84	14.54	13.5	11.07	30.80	13.5	22.09	39.92	13.5	43.92	41.77	13.5	33.71	56.22
14.4	2.70	14.88	14.4	10.87	31.05	14.5	22.05	40.32	14.5	43.91	42.03	14.5	33.71	56.63
15.4	2.55	15.18	15.4	10.69	31.33	15.5	22.00	40.70	15.5	43.88	42.31	15.5	33.71	57.01
16.4	2.39	15.47	16.4	10.50	31.62	16.5	21.93	41.07	16.5	43.84	42.62	16.5	33.70	57.39
17.4	2.24	15.74	17.4	10.26	31.91	17.5	21.87	41.42	17.5	43.80	42.94	17.5	33.69	57.76
18.4	2.10	16.00	18.4	9.96	32.22	18.5	21.82	41.74	18.5	43.74	43.28	18.5	33.69	58.09
19.4	1.96	16.27	19.4	9.59	32.53	19.5	21.79	42.06	19.5	43.66	43.62	19.5	33.69	58.41
20.4	1.85	16.55	20.4	9.18	32.84	20.5	21.77	42.38	20.5	43.58	43.95	20.5	33.72	58.74
21.4	1.74	16.83	21.4	8.75	33.12	21.5	21.76	42.72	21.5	43.47	44.27	21.5	33.76	59.10
22.4	1.63	17.14	22.4	8.29	33.36	22.4	21.75	43.09	22.4	43.36	44.55	22.5	33.80	59.46
23.4	1.50	17.46	23.4	7.85	33.59	23.4	21.73	43.46	23.4	43.25	44.80	23.5	33.84	59.84
24.4	1.37	17.78	24.4	7.42	33.81	24.4	21.70	43.85	24.4	43.16	45.05	24.5	33.86	60.23
25.4	1.23	18.07	25.4	7.04	34.03	25.4	21.66	44.23	25.4	43.08	45.30	25.5	33.87	60.62
26.4	1.06	18.37	26.4	6.66	34.24	26.4	21.60	44.61	26.4	42.99	45.54	26.5	33.86	61.02
27.4	0.89	18.64	27.4	6.32	34.46	27.4	21.52	44.98	27.4	42.92	45.79	27.5	33.82	61.41
28.4	0.71	18.89	28.4	5.99	34.69	28.4	21.44	45.34	28.4	42.84	46.05	28.5	33.77	61.78
29.4	0.53	19.13	29.4	5.64	34.93	29.4	21.34	45.68	29.4	42.77	46.32	29.5	33.71	62.14
30.4	0.35	19.36	30.4	5.27	35.18	30.4	21.24	46.00	30.4	42.69	46.60	30.5	33.64	62.48
31.3	0.18	19.56	31.4	4.86	35.44	31.4	21.14	46.30	31.4	42.59	46.88	31.5	33.58	62.80
9.82      -9.77			31.12    +31.11			10.78      -10.73			9.35        +9.30			12.38      -12.34		
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 14 13	° ' -83 17	Apr.	h m 15 3	° ' +87 32	Apr.	h m 15 24	° ' -84 11	Apr.	h m 16 54	° ' +82 10	Apr.	h m 17 16	° ' -80 46
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	41.70	26.36	0.6	57.73	49.51	0.6	12.62	28.96	0.7	26.72	9.09	0.7	4.14	55.89
1.6	41.78	26.73	1.6	58.04	49.75	1.6	12.79	29.26	1.7	26.86	9.22	1.7	4.29	56.06
2.6	41.86	27.09	2.6	58.35	50.02	2.6	12.93	29.57	2.7	27.01	9.37	2.7	4.44	56.21
3.6	41.93	27.43	3.6	58.65	50.29	3.6	13.08	29.85	3.7	27.15	9.52	3.7	4.57	56.35
4.6	42.01	27.77	4.6	58.93	50.59	4.6	13.23	30.14	4.7	27.31	9.69	4.7	4.71	56.49
5.6	42.08	28.07	5.6	59.20	50.90	5.6	13.38	30.40	5.7	27.45	9.88	5.7	4.85	56.64
6.6	42.16	28.38	6.6	59.43	51.21	6.6	13.53	30.64	6.7	27.59	10.11	6.7	4.98	56.74
7.5	42.24	28.70	7.6	59.63	51.54	7.6	13.70	30.90	7.7	27.72	10.35	7.7	5.12	56.84
8.5	42.35	29.01	8.6	59.80	51.86	8.6	13.88	31.16	8.7	27.85	10.59	8.7	5.27	56.95
9.5	42.45	29.33	9.6	59.93	52.17	9.6	14.05	31.43	9.7	27.97	10.82	9.7	5.43	57.07
10.5	42.55	29.69	10.6	60.06	52.47	10.6	14.24	31.71	10.7	28.07	11.06	10.7	5.60	57.19
11.5	42.66	30.06	11.6	60.18	52.75	11.6	14.43	32.02	11.6	28.17	11.29	11.7	5.77	57.32
12.5	42.75	30.45	12.6	60.31	53.02	12.6	14.62	32.34	12.6	28.28	11.49	12.7	5.95	57.49
13.5	42.84	30.85	13.6	60.44	53.28	13.6	14.79	32.68	13.6	28.39	11.68	13.7	6.12	57.68
14.5	42.89	31.26	14.6	60.61	53.54	14.6	14.93	33.03	14.6	28.49	11.87	14.7	6.26	57.88
15.5	42.94	31.65	15.6	60.79	53.80	15.6	15.06	33.38	15.6	28.62	12.05	15.7	6.41	58.09
16.5	42.98	32.01	16.6	60.98	54.08	16.6	15.17	33.71	16.6	28.74	12.25	16.7	6.55	58.30
17.5	43.01	32.35	17.6	61.17	54.39	17.6	15.27	34.03	17.6	28.86	12.47	17.6	6.68	58.51
18.5	43.05	32.69	18.6	61.32	54.71	18.6	15.38	34.32	18.6	28.97	12.73	18.6	6.78	58.70
19.5	43.09	33.00	19.6	61.44	55.06	19.6	15.50	34.59	19.6	29.09	13.00	19.6	6.90	58.85
20.5	43.15	33.31	20.5	61.52	55.41	20.6	15.63	34.87	20.6	29.19	13.30	20.6	7.03	59.00
21.5	43.22	33.64	21.5	61.56	55.76	21.6	15.77	35.15	21.6	29.28	13.61	21.6	7.17	59.14
22.5	43.30	33.97	22.5	61.56	56.10	22.6	15.92	35.43	22.6	29.37	13.92	22.6	7.32	59.30
23.5	43.36	34.34	23.5	61.57	56.41	23.6	16.08	35.75	23.6	29.45	14.21	23.6	7.47	59.46
24.5	43.42	34.71	24.5	61.58	56.73	24.6	16.22	36.08	24.6	29.53	14.50	24.6	7.62	59.65
25.5	43.48	35.10	25.5	61.58	57.01	25.5	16.36	36.42	25.6	29.61	14.76	25.6	7.78	59.87
26.5	43.53	35.48	26.5	61.61	57.30	26.5	16.48	36.79	26.6	29.69	15.02	26.6	7.92	60.09
27.5	43.54	35.86	27.5	61.66	57.57	27.5	16.58	37.14	27.6	29.77	15.26	27.6	8.06	60.33
28.5	43.56	36.24	28.5	61.71	57.86	28.5	16.68	37.49	28.6	29.85	15.50	28.6	8.18	60.58
29.5	43.57	36.61	29.5	61.77	58.17	29.5	16.76	37.84	29.6	29.94	15.76	29.6	8.29	60.81
30.5	43.56	36.95	30.5	61.83	58.48	30.5	16.82	38.18	30.6	30.03	16.02	30.6	8.40	61.05
31.5	43.55	37.28	31.5	61.86	58.80	31.5	16.88	38.51	31.6	30.11	16.30	31.6	8.50	61.29
8.56      -8.50			23.37    +23.35			9.88      -9.83			7.34      +7.27			6.24      -6.16		
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21''.03			+87° 33' 10''.52			-84° 11' 30''.39			+82° 10' 32''.75			-80° 47' 6''.56		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 17 58	° ' +86 36	Apr.	h m 18 6	° ' -87 39	Apr.	h m 19 1	° ' +89 0	Apr.	h m 19 28	° ' -89 13	Apr.	h m 20 48	° ' +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	54.71	29.25	0.7	38.16	36.38	0.8	50.93	43.34	0.8	26.08	8.64	0.8	32.48	18.05
1.7	55.05	29.29	1.7	38.79	36.47	1.8	52.13	43.29	1.8	27.96	8.58	1.8	32.61	17.88
2.7	55.42	29.34	2.7	39.39	36.54	2.8	53.38	43.27	2.8	29.78	8.52	2.8	32.74	17.71
3.7	55.80	29.42	3.7	39.96	36.60	3.8	54.67	43.26	3.8	31.54	8.46	3.8	32.89	17.56
4.7	56.17	29.51	4.7	40.53	36.66	4.8	56.01	43.26	4.8	33.24	8.40	4.8	33.04	17.41
5.7	56.55	29.60	5.7	41.09	36.72	5.8	57.36	43.27	5.8	34.91	8.32	5.8	33.20	17.26
6.7	56.91	29.74	6.7	41.66	36.77	6.8	58.73	43.31	6.8	36.56	8.24	6.8	33.37	17.15
7.7	57.28	29.89	7.7	42.23	36.79	7.7	60.06	43.37	7.8	38.23	8.15	7.8	33.54	17.06
8.7	57.61	30.06	8.7	42.83	36.81	8.7	61.35	43.45	8.8	39.97	8.05	8.8	33.69	16.99
9.7	57.94	30.23	9.7	43.47	36.85	9.7	62.56	43.54	9.8	41.79	7.95	9.8	33.86	16.93
10.7	58.24	30.40	10.7	44.12	36.90	10.7	63.70	43.63	10.8	43.71	7.85	10.8	34.02	16.89
11.7	58.52	30.55	11.7	44.81	36.98	11.7	64.77	43.71	11.8	45.72	7.77	11.8	34.17	16.85
12.7	58.80	30.71	12.7	45.50	37.06	12.7	65.80	43.79	12.8	47.80	7.72	12.8	34.32	16.81
13.7	59.08	30.83	13.7	46.18	37.19	13.7	66.82	43.85	13.8	49.90	7.71	13.8	34.45	16.76
14.7	59.37	30.94	14.7	46.83	37.33	14.7	67.86	43.89	14.7	51.94	7.69	14.8	34.59	16.67
15.7	59.68	31.05	15.7	47.44	37.48	15.7	68.97	43.92	15.7	53.90	7.69	15.8	34.73	16.58
16.7	60.00	31.18	16.7	48.01	37.63	16.7	70.16	43.97	16.7	55.75	7.72	16.8	34.88	16.48
17.7	60.33	31.33	17.7	48.54	37.76	17.7	71.41	44.03	17.7	57.48	7.74	17.8	35.05	16.40
18.7	60.67	31.51	18.7	49.06	37.89	18.7	72.71	44.11	18.7	59.13	7.74	18.8	35.22	16.34
19.7	61.00	31.71	19.7	49.58	37.99	19.7	74.01	44.22	19.7	60.76	7.72	19.8	35.39	16.31
20.7	61.32	31.94	20.7	50.12	38.07	20.7	75.27	44.36	20.7	62.43	7.68	20.8	35.57	16.31
21.7	61.61	32.19	21.7	50.69	38.15	21.7	76.46	44.53	21.7	64.16	7.63	21.8	35.74	16.32
22.7	61.88	32.43	22.7	51.28	38.24	22.7	77.59	44.71	22.7	65.97	7.59	22.8	35.92	16.36
23.7	62.12	32.66	23.7	51.90	38.35	23.7	78.63	44.89	23.7	67.87	7.57	23.8	36.07	16.39
24.7	62.37	32.89	24.7	52.53	38.47	24.7	79.61	45.03	24.7	69.83	7.56	24.8	36.23	16.43
25.7	62.60	33.11	25.7	53.15	38.61	25.7	80.58	45.17	25.7	71.81	7.57	25.8	36.39	16.46
26.7	62.83	33.31	26.7	53.77	38.78	26.7	81.55	45.31	26.7	73.79	7.61	26.8	36.54	16.47
27.7	63.08	33.49	27.7	54.34	38.96	27.7	82.52	45.42	27.7	75.72	7.67	27.8	36.69	16.48
28.6	63.33	33.69	28.7	54.90	39.15	28.7	83.54	45.53	28.7	77.58	7.73	28.8	36.83	16.48
29.6	63.60	33.88	29.7	55.41	39.34	29.7	84.61	45.66	29.7	79.37	7.80	29.8	36.99	16.47
30.6	63.88	34.10	30.6	55.90	39.54	30.7	85.71	45.79	30.7	81.07	7.87	30.8	37.15	16.47
31.6	64.15	34.32	31.6	56.37	39.73	31.7	86.83	45.93	31.7	82.71	7.94	31.8	37.31	16.50
16.90 +16.87			24.50 -24.48			58.01 +58.00			73.35 -73.34			7.39 +7.32		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m s	° ' "	Apr.	h m s	° ' "	Apr.	h m s	° ' "	Apr.	h m s	° ' "	Apr.	h m s	° ' "
	21 38	-83 5		22 16	-86 22		22 37	-81 48		23 27	+86 50		23 47	-82 28
0.9	19.32	46.51	0.9	2.96	66.95	0.9	36.56	43.65	0.9	18.87	62.81	0.9	10.79	33.14
1.9	19.48	46.26	1.9	3.23	66.66	1.9	36.66	43.33	1.9	18.97	62.52	1.9	10.85	32.77
2.9	19.64	46.01	2.9	3.49	66.36	2.9	36.76	43.00	2.9	19.10	62.21	2.9	10.91	32.41
3.9	19.79	45.77	3.9	3.73	66.07	3.9	36.87	42.70	3.9	19.24	61.90	3.9	10.97	32.05
4.9	19.94	45.53	4.9	3.96	65.79	4.9	36.96	42.40	4.9	19.41	61.59	4.9	11.02	31.72
5.9	20.08	45.27	5.9	4.18	65.53	5.9	37.05	42.10	5.9	19.60	61.27	5.9	11.06	31.39
6.9	20.22	45.02	6.9	4.39	65.26	6.9	37.13	41.80	6.9	19.82	60.98	6.9	11.09	31.05
7.9	20.35	44.76	7.9	4.59	64.95	7.9	37.21	41.48	7.9	20.05	60.69	7.9	11.12	30.69
8.9	20.49	44.49	8.9	4.81	64.64	8.9	37.28	41.15	8.9	20.30	60.43	8.9	11.17	30.33
9.9	20.65	44.20	9.9	5.03	64.32	9.9	37.38	40.81	9.9	20.57	60.19	9.9	11.21	29.93
10.9	20.82	43.91	10.9	5.30	63.98	10.9	37.47	40.45	10.9	20.82	59.96	10.9	11.27	29.53
11.8	20.99	43.62	11.9	5.57	63.65	11.9	37.60	40.09	11.9	21.06	59.74	11.9	11.33	29.14
12.8	21.18	43.34	12.9	5.88	63.33	12.9	37.73	39.73	12.9	21.28	59.54	12.9	11.42	28.73
13.8	21.39	43.09	13.9	6.21	63.03	13.9	37.87	39.40	13.9	21.47	59.32	13.9	11.51	28.34
14.8	21.59	42.85	14.9	6.54	62.75	14.9	38.02	39.09	14.9	21.66	59.10	14.9	11.61	27.96
15.8	21.79	42.65	15.9	6.88	62.50	15.9	38.15	38.81	15.9	21.83	58.85	15.9	11.71	27.59
16.8	21.98	42.46	16.9	7.20	62.26	16.9	38.28	38.55	16.9	22.04	58.58	16.9	11.81	27.27
17.8	22.16	42.28	17.9	7.49	62.03	17.9	38.39	38.29	17.9	22.27	58.32	17.9	11.90	26.95
18.8	22.30	42.08	18.9	7.75	61.79	18.9	38.50	38.02	18.9	22.54	58.07	18.9	11.97	26.63
19.8	22.47	41.88	19.9	8.00	61.56	19.9	38.60	37.75	19.9	22.84	57.82	19.9	12.03	26.32
20.8	22.63	41.67	20.8	8.24	61.29	20.9	38.71	37.48	20.9	23.16	57.58	20.9	12.09	25.99
21.8	22.79	41.44	21.8	8.50	61.02	21.9	38.81	37.18	21.9	23.50	57.38	21.9	12.15	25.65
22.8	22.95	41.20	22.8	8.78	60.75	22.9	38.93	36.87	22.9	23.83	57.19	22.9	12.23	25.28
23.8	23.13	40.96	23.8	9.07	60.47	23.9	39.06	36.55	23.9	24.16	57.02	23.9	12.31	24.91
24.8	23.33	40.72	24.8	9.39	60.18	24.9	39.19	36.24	24.9	24.47	56.85	24.9	12.41	24.53
25.8	23.53	40.52	25.8	9.73	59.93	25.8	39.33	35.95	25.9	24.75	56.68	25.9	12.52	24.17
26.8	23.74	40.32	26.8	10.09	59.70	26.8	39.48	35.67	26.9	25.03	56.52	26.9	12.65	23.83
27.8	23.95	40.14	27.8	10.44	59.46	27.8	39.64	35.42	27.9	25.29	56.34	27.9	12.77	23.50
28.8	24.15	39.98	28.8	10.79	59.25	28.8	39.79	35.18	28.9	25.56	56.16	28.9	12.89	23.16
29.8	24.36	39.83	29.8	11.14	59.06	29.8	39.94	34.95	29.9	25.83	55.96	29.9	13.01	22.87
30.8	24.55	39.70	30.8	11.48	58.87	30.8	40.09	34.74	30.9	26.12	55.75	30.9	13.12	22.57
31.8	24.74	39.60	31.8	11.79	58.69	31.8	40.22	34.54	31.9	26.42	55.55	31.9	13.23	22.28
8.32	-8.26		15.86	-15.82		7.02	-6.95		18.20	+18.17		7.64	-7.57	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 5 45	° ' -84 49	May	h m 6 46	° ' -80 43	May	h m 7 2	° ' +87 11	May	h m 7 13	° ' +82 34	May	h m 7 15	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	56.86	57.46	1.2	50.93	55.74	1.2	11.29	10.61	1.2	46.66	45.14	1.2	56.36	26.66
2.1	56.67	57.24	2.2	50.81	55.58	2.2	10.89	10.46	2.2	46.51	45.01	2.2	55.97	26.56
3.1	56.48	57.04	3.2	50.68	55.44	3.2	10.48	10.28	3.2	46.35	44.86	3.2	55.58	26.48
4.1	56.29	56.84	4.2	50.56	55.32	4.2	10.09	10.08	4.2	46.20	44.70	4.2	55.19	26.40
5.1	56.10	56.65	5.2	50.44	55.22	5.2	9.71	9.86	5.2	46.05	44.51	5.2	54.81	26.34
6.1	55.90	56.48	6.2	50.32	55.11	6.2	9.37	9.63	6.2	45.91	44.31	6.2	54.41	26.28
7.1	55.70	56.31	7.2	50.20	55.00	7.2	9.04	9.41	7.2	45.80	44.10	7.2	54.00	26.22
8.1	55.47	56.10	8.2	50.06	54.88	8.2	8.76	9.19	8.2	45.69	43.89	8.2	53.57	26.15
9.1	55.25	55.87	9.2	49.93	54.75	9.2	8.51	8.98	9.2	45.59	43.69	9.2	53.12	26.07
10.1	55.03	55.63	10.1	49.79	54.59	10.2	8.28	8.77	10.2	45.50	43.50	10.2	52.66	25.95
11.1	54.83	55.35	11.1	49.66	54.39	11.2	8.04	8.57	11.2	45.42	43.33	11.2	52.20	25.82
12.1	54.63	55.06	12.1	49.53	54.16	12.2	7.79	8.40	12.2	45.33	43.18	12.2	51.76	25.66
13.1	54.45	54.77	13.1	49.41	53.93	13.2	7.52	8.23	13.2	45.23	43.03	13.2	51.34	25.48
14.1	54.28	54.48	14.1	49.29	53.71	14.1	7.22	8.04	14.2	45.12	42.86	14.2	50.96	25.30
15.1	54.13	54.20	15.1	49.18	53.50	15.1	6.90	7.84	15.2	45.00	42.69	15.2	50.59	25.14
16.1	53.98	53.95	16.1	49.08	53.30	16.1	6.58	7.62	16.2	44.87	42.49	16.2	50.25	25.00
17.1	53.83	53.73	17.1	48.97	53.12	17.1	6.24	7.38	17.1	44.73	42.26	17.2	49.92	24.87
18.1	53.69	53.49	18.1	48.87	52.97	18.1	5.94	7.11	18.1	44.62	42.01	18.1	49.58	24.75
19.1	53.52	53.27	19.1	48.77	52.81	19.1	5.67	6.82	19.1	44.51	41.74	19.1	49.22	24.63
20.1	53.35	53.05	20.1	48.66	52.64	20.1	5.43	6.52	20.1	44.41	41.47	20.1	48.85	24.51
21.1	53.18	52.81	21.1	48.55	52.46	21.1	5.22	6.23	21.1	44.34	41.21	21.1	48.47	24.38
22.1	53.00	52.55	22.1	48.44	52.26	22.1	5.03	5.96	22.1	44.27	40.96	22.1	48.07	24.25
23.1	52.84	52.26	23.1	48.33	52.04	23.1	4.85	5.70	23.1	44.20	40.72	23.1	47.68	24.07
24.1	52.69	51.95	24.1	48.22	51.80	24.1	4.69	5.45	24.1	44.14	40.50	24.1	47.29	23.87
25.1	52.54	51.63	25.1	48.11	51.55	25.1	4.50	5.21	25.1	44.07	40.29	25.1	46.91	23.67
26.1	52.40	51.32	26.1	48.01	51.28	26.1	4.30	4.97	26.1	43.99	40.07	26.1	46.56	23.45
27.1	52.28	50.99	27.1	47.91	51.01	27.1	4.09	4.75	27.1	43.91	39.86	27.1	46.22	23.22
28.1	52.17	50.68	28.1	47.82	50.73	28.1	3.87	4.51	28.1	43.82	39.63	28.1	45.89	22.99
29.1	52.07	50.36	29.1	47.73	50.46	29.1	3.64	4.27	29.1	43.73	39.41	29.1	45.60	22.76
30.1	51.98	50.06	30.1	47.65	50.21	30.1	3.41	4.01	30.1	43.64	39.16	30.1	45.32	22.56
31.0	51.88	49.78	31.1	47.57	49.99	31.1	3.17	3.73	31.1	43.55	38.89	31.1	45.04	22.36
32.0	51.78	49.52	32.1	47.50	49.76	32.1	2.96	3.42	32.1	43.46	38.61	32.1	44.76	22.18
11.10 -11.06			6.21 -6.13			20.37 +20.34			7.74 +7.68			18.53 -18.51		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			♄ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 8 15	° ' " +88 53	May	h m 9 8	° ' " -85 20	May	h m 9 25	° ' " +81 41	May	h m 9 36	° ' " -80 34	May	h m 10 21	° ' " +82 59
	s	"		s	"		s	"		s	"		s	"
1.2	80.60	14.29	1.3	52.32	25.10	1.3	29.47	51.29	1.3	21.95	35.67	1.3	14.86	0.69
2.2	79.48	14.24	2.3	52.05	25.16	2.3	29.32	51.35	2.3	21.82	35.77	2.3	14.69	0.84
3.2	78.34	14.16	3.3	51.80	25.23	3.3	29.16	51.39	3.3	21.70	35.86	3.3	14.52	0.96
4.2	77.18	14.08	4.3	51.54	25.31	4.3	29.01	51.40	4.3	21.59	35.97	4.3	14.34	1.07
5.2	76.04	13.97	5.3	51.30	25.40	5.3	28.85	51.41	5.3	21.47	36.09	5.3	14.16	1.15
6.2	74.93	13.84	6.3	51.05	25.49	6.3	28.69	51.38	6.3	21.35	36.21	6.3	13.97	1.20
7.2	73.89	13.69	7.3	50.79	25.60	7.3	28.55	51.34	7.3	21.23	36.36	7.3	13.80	1.26
8.2	72.94	13.54	8.3	50.52	25.72	8.3	28.41	51.29	8.3	21.11	36.50	8.3	13.64	1.26
9.2	72.05	13.39	9.3	50.23	25.82	9.3	28.29	51.23	9.3	20.99	36.64	9.3	13.49	1.28
10.2	71.25	13.25	10.2	49.92	25.89	10.3	28.19	51.18	10.3	20.86	36.76	10.3	13.35	1.30
11.2	70.45	13.12	11.2	49.61	25.94	11.3	28.08	51.14	11.3	20.72	36.85	11.3	13.22	1.33
12.2	69.64	13.01	12.2	49.30	25.96	12.3	27.98	51.10	12.3	20.57	36.91	12.3	13.09	1.37
13.2	68.78	12.91	13.2	49.00	25.96	13.3	27.85	51.10	13.3	20.42	36.96	13.3	12.96	1.41
14.2	67.86	12.81	14.2	48.71	25.96	14.3	27.73	51.09	14.3	20.28	36.99	14.3	12.81	1.47
15.2	66.86	12.69	15.2	48.43	25.95	15.2	27.59	51.08	15.3	20.15	37.01	15.3	12.63	1.55
16.2	65.81	12.56	16.2	48.17	25.95	16.2	27.43	51.06	16.3	20.02	37.03	16.3	12.46	1.60
17.2	64.74	12.39	17.2	47.93	25.95	17.2	27.28	51.01	17.2	19.90	37.06	17.3	12.27	1.65
18.2	63.70	12.20	18.2	47.69	25.98	18.2	27.13	50.93	18.2	19.78	37.10	18.3	12.08	1.64
19.2	62.72	11.98	19.2	47.45	26.01	19.2	26.98	50.84	19.2	19.67	37.18	19.3	11.89	1.62
20.2	61.81	11.76	20.2	47.19	26.05	20.2	26.84	50.73	20.2	19.55	37.26	20.3	11.71	1.59
21.2	60.98	11.54	21.2	46.92	26.09	21.2	26.71	50.60	21.2	19.44	37.33	21.3	11.56	1.54
22.2	60.22	11.31	22.2	46.64	26.12	22.2	26.61	50.48	22.2	19.31	37.39	22.3	11.41	1.49
23.2	59.48	11.12	23.2	46.36	26.13	23.2	26.50	50.37	23.2	19.18	37.43	23.3	11.26	1.44
24.2	58.79	10.92	24.2	46.07	26.10	24.2	26.39	50.27	24.2	19.04	37.43	24.3	11.12	1.40
25.2	58.06	10.74	25.2	45.78	26.07	25.2	26.29	50.18	25.2	18.91	37.42	25.3	10.99	1.37
26.2	57.32	10.57	26.2	45.48	26.02	26.2	26.17	50.10	26.2	18.76	37.39	26.3	10.85	1.35
27.2	56.55	10.40	27.2	45.21	25.95	27.2	26.05	50.02	27.2	18.62	37.36	27.3	10.70	1.33
28.2	55.73	10.22	28.2	44.93	25.87	28.2	25.92	49.95	28.2	18.49	37.33	28.2	10.54	1.32
29.2	54.89	10.04	29.2	44.68	25.79	29.2	25.79	49.86	29.2	18.36	37.28	29.2	10.37	1.30
30.2	54.02	9.85	30.2	44.44	25.71	30.2	25.66	49.76	30.2	18.24	37.22	30.2	10.19	1.27
31.2	53.14	9.64	31.2	44.20	25.64	31.2	25.52	49.64	31.2	18.13	37.17	31.2	10.02	1.23
32.2	52.28	9.38	32.2	43.97	25.58	32.2	25.39	49.50	32.2	18.02	37.13	32.2	9.84	1.17
51.48 +51.47			12.31 -12.27			6.93 +6.85			6.11 -6.03			8.19 +8.13		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 14 13	° ' -83 17	May	h m 15 3	° ' +87 32	May	h m 15 24	° ' -84 11	May	h m 16 54	° ' +82 10	May	h m 17 16	° ' -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.5	43.55	37.28	1.5	61.86	58.80	1.5	16.88	38.51	1.6	30.11	16.30	1.6	8.50	1.29
2.5	43.55	37.60	2.5	61.88	59.14	2.5	16.95	38.82	2.6	30.21	16.61	2.6	8.60	1.52
3.5	43.56	37.91	3.5	61.89	59.48	3.5	17.02	39.11	3.6	30.29	16.93	3.6	8.70	1.72
4.5	43.56	38.21	4.5	61.85	59.83	4.5	17.10	39.41	4.6	30.34	17.26	4.6	8.80	1.92
5.5	43.59	38.53	5.5	61.77	60.19	5.5	17.18	39.70	5.6	30.41	17.60	5.6	8.91	2.11
6.5	43.62	38.85	6.5	61.67	60.54	6.5	17.28	39.99	6.6	30.47	17.94	6.6	9.03	2.30
7.5	43.64	39.18	7.5	61.55	60.87	7.5	17.38	40.31	7.6	30.52	18.28	7.6	9.17	2.52
8.5	43.67	39.54	8.5	61.41	61.17	8.5	17.49	40.63	8.6	30.56	18.61	8.6	9.30	2.74
9.5	43.70	39.92	9.5	61.28	61.46	9.5	17.59	40.98	9.6	30.60	18.90	9.6	9.43	2.98
10.5	43.71	40.29	10.5	61.17	61.73	10.5	17.68	41.35	10.6	30.64	19.19	10.6	9.56	3.25
11.5	43.70	40.67	11.5	61.07	61.99	11.5	17.74	41.73	11.6	30.68	19.47	11.6	9.68	3.52
12.5	43.67	41.04	12.5	60.99	62.27	12.5	17.79	42.10	12.6	30.72	19.75	12.6	9.78	3.82
13.5	43.63	41.40	13.5	60.93	62.54	13.5	17.83	42.46	13.6	30.77	20.02	13.6	9.87	4.12
14.4	43.59	41.73	14.5	60.86	62.85	14.5	17.84	42.81	14.6	30.82	20.30	14.6	9.96	4.41
15.4	43.55	42.05	15.5	60.77	63.17	15.5	17.86	43.14	15.6	30.88	20.62	15.6	10.03	4.67
16.4	43.51	42.33	16.5	60.65	63.50	16.5	17.89	43.43	16.6	30.92	20.97	16.6	10.11	4.91
17.4	43.48	42.61	17.5	60.49	63.83	17.5	17.92	43.72	17.6	30.96	21.32	17.6	10.18	5.13
18.4	43.47	42.90	18.5	60.31	64.18	18.5	17.96	44.01	18.5	30.99	21.69	18.6	10.27	5.36
19.4	43.46	43.20	19.5	60.08	64.50	19.5	18.01	44.31	19.5	31.00	22.07	19.6	10.36	5.57
20.4	43.46	43.52	20.5	59.83	64.81	20.5	18.07	44.62	20.5	31.01	22.42	20.6	10.47	5.80
21.4	43.45	43.85	21.5	59.58	65.10	21.5	18.13	44.95	21.5	31.01	22.76	21.6	10.58	6.05
22.4	43.43	44.20	22.5	59.34	65.38	22.5	18.19	45.30	22.5	31.02	23.09	22.6	10.68	6.31
23.4	43.40	44.54	23.5	59.11	65.64	23.5	18.23	45.66	23.5	31.02	23.40	23.5	10.78	6.60
24.4	43.35	44.89	24.5	58.90	65.88	24.5	18.24	46.03	24.5	31.03	23.70	24.5	10.87	6.92
25.4	43.30	45.23	25.5	58.71	66.14	25.5	18.25	46.39	25.5	31.04	24.00	25.5	10.95	7.23
26.4	43.23	45.56	26.4	58.52	66.41	26.5	18.24	46.73	26.5	31.06	24.29	26.5	11.02	7.54
27.4	43.15	45.86	27.4	58.35	66.67	27.5	18.21	47.08	27.5	31.07	24.59	27.5	11.07	7.84
28.4	43.07	46.14	28.4	58.15	66.94	28.5	18.18	47.41	28.5	31.08	24.91	28.5	11.12	8.13
29.4	42.99	46.41	29.4	57.93	67.22	29.5	18.15	47.71	29.5	31.09	25.24	29.5	11.17	8.42
30.4	42.91	46.67	30.4	57.71	67.51	30.5	18.14	47.99	30.5	31.10	25.58	30.5	11.22	8.68
31.4	42.85	46.91	31.4	57.44	67.82	31.4	18.12	48.26	31.5	31.10	25.94	31.5	11.26	8.94
32.4	42.80	47.16	32.4	57.14	68.13	32.4	18.11	48.54	32.5	31.10	26.31	32.5	11.32	9.18
8.56	-8.51		23.40	+23.38		9.89	-9.84		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup>	27 <sup>s</sup> .793		15 <sup>h</sup> 3 <sup>m</sup>	41 <sup>s</sup> .175		15 <sup>h</sup> 23 <sup>m</sup>	56 <sup>s</sup> .594		16 <sup>h</sup> 54 <sup>m</sup>	25 <sup>s</sup> .488		17 <sup>h</sup> 15 <sup>m</sup>	54 <sup>s</sup> .896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 17 59	° ' " +86 36	May	h m 18 6	° ' " -87 39	May	h m 19 2	° ' " +89 0	May	h m 19 29	° ' " -89 13	May	h m 20 48	° ' " +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
1.6	4.15	34.32	1.6	56.37	39.73	1.7	26.83	45.93	1.7	22.71	7.94	1.8	37.31	16.50
2.6	4.42	34.55	2.6	56.84	39.91	2.7	27.98	46.10	2.7	24.30	8.01	2.8	37.48	16.53
3.6	4.69	34.81	3.6	57.29	40.07	3.7	29.12	46.28	3.7	25.84	8.08	3.8	37.66	16.57
4.6	4.94	35.08	4.6	57.75	40.22	4.7	30.24	46.47	4.7	27.41	8.11	4.7	37.83	16.62
5.6	5.18	35.37	5.6	58.22	40.36	5.7	31.30	46.71	5.7	28.99	8.14	5.7	38.01	16.72
6.6	5.39	35.68	6.6	58.72	40.50	6.7	32.30	46.95	6.7	30.65	8.18	6.7	38.18	16.84
7.6	5.58	35.97	7.6	59.26	40.66	7.7	33.21	47.19	7.7	32.39	8.22	7.7	38.35	16.97
8.6	5.76	36.27	8.6	59.81	40.83	8.7	34.03	47.42	8.7	34.23	8.27	8.7	38.50	17.10
9.6	5.91	36.54	9.6	60.38	41.02	9.7	34.79	47.66	9.7	36.14	8.33	9.7	38.65	17.23
10.6	6.06	36.79	10.6	60.94	41.25	10.7	35.52	47.85	10.7	38.05	8.42	10.7	38.80	17.34
11.6	6.21	37.03	11.6	61.47	41.50	11.7	36.25	48.04	11.7	39.94	8.55	11.7	38.93	17.44
12.6	6.39	37.27	12.6	61.97	41.77	12.7	37.02	48.23	12.7	41.75	8.68	12.7	39.07	17.53
13.6	6.58	37.50	13.6	62.41	42.02	13.7	37.85	48.40	13.7	43.43	8.83	13.7	39.22	17.61
14.6	6.77	37.75	14.6	62.81	42.26	14.6	38.76	48.59	14.7	44.99	8.98	14.7	39.36	17.69
15.6	6.97	38.02	15.6	63.19	42.50	15.6	39.70	48.82	15.7	46.45	9.12	15.7	39.51	17.78
16.6	7.17	38.32	16.6	63.56	42.71	16.6	40.66	49.05	16.7	47.84	9.24	16.7	39.69	17.90
17.6	7.36	38.65	17.6	63.93	42.91	17.6	41.60	49.32	17.7	49.22	9.34	17.7	39.86	18.05
18.6	7.52	38.98	18.6	64.34	43.10	18.6	42.47	49.61	18.7	50.65	9.42	18.7	40.03	18.23
19.6	7.66	39.33	19.6	64.76	43.28	19.6	43.25	49.91	19.7	52.17	9.51	19.7	40.18	18.41
20.6	7.76	39.67	20.6	65.21	43.47	20.6	43.93	50.21	20.7	53.77	9.60	20.7	40.33	18.61
21.6	7.86	40.00	21.6	65.68	43.69	21.6	44.55	50.50	21.6	55.43	9.72	21.7	40.48	18.82
22.6	7.95	40.32	22.6	66.15	43.92	22.6	45.12	50.78	22.6	57.12	9.85	22.7	40.62	19.01
23.6	8.04	40.60	23.6	66.59	44.19	23.6	45.67	51.03	23.6	58.81	9.98	23.7	40.75	19.19
24.6	8.13	40.89	24.6	67.01	44.45	24.6	46.23	51.28	24.6	60.44	10.15	24.7	40.88	19.37
25.6	8.23	41.16	25.6	67.40	44.73	25.6	46.82	51.51	25.6	62.00	10.34	25.7	41.02	19.52
26.6	8.33	41.43	26.6	67.76	45.01	26.6	47.43	51.74	26.6	63.49	10.54	26.7	41.15	19.68
27.6	8.44	41.72	27.6	68.08	45.30	27.6	48.07	51.99	27.6	64.88	10.74	27.7	41.28	19.82
28.6	8.55	42.02	28.6	68.37	45.58	28.6	48.75	52.26	28.6	66.19	10.95	28.7	41.41	19.99
29.6	8.66	42.32	29.6	68.66	45.86	29.6	49.44	52.52	29.6	67.43	11.14	29.7	41.55	20.16
30.6	8.78	42.64	30.6	68.93	46.11	30.6	50.14	52.80	30.6	68.63	11.32	30.7	41.69	20.35
31.6	8.88	42.99	31.6	69.20	46.35	31.6	50.80	53.11	31.6	69.80	11.50	31.7	41.84	20.58
32.6	8.97	43.35	32.6	69.48	46.59	32.6	51.42	53.43	32.6	71.00	11.65	32.7	41.99	20.81
16.91 +16.88			24.51 -24.49			58.09 +58.08			73.38 -73.38			7.39 +7.32		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 21 38	° ' " -83 5	May	h m 22 16	° ' " -86 22	May	h m 22 37	° ' " -81 48	May	h m 23 27	° ' " +86 50	May	h m 23 47	° ' " -82 28
	s s	"		s s	"		s s	"		s s	"		s s	"
1.8	24.74	39.60	1.8	11.79	58.69	1.8	40.22	34.54	1.9	26.42	55.55	1.9	13.23	22.28
2.8	24.91	39.46	2.8	12.11	58.51	2.8	40.35	34.35	2.9	26.75	55.35	2.9	13.33	22.01
3.8	25.08	39.33	3.8	12.40	58.34	3.8	40.48	34.13	3.9	27.12	55.15	3.9	13.43	21.74
4.8	25.25	39.18	4.8	12.69	58.15	4.8	40.59	33.91	4.9	27.48	54.98	4.9	13.53	21.47
5.8	25.42	39.04	5.8	12.98	57.97	5.8	40.71	33.70	5.9	27.86	54.84	5.9	13.63	21.18
6.8	25.60	38.88	6.8	13.27	57.74	6.8	40.84	33.46	6.9	28.27	54.69	6.9	13.73	20.87
7.8	25.78	38.71	7.8	13.59	57.53	7.8	40.97	33.22	7.9	28.66	54.59	7.9	13.83	20.56
8.8	25.99	38.55	8.8	13.94	57.31	8.8	41.13	32.98	8.8	29.04	54.49	8.9	13.95	20.25
9.8	26.20	38.40	9.8	14.30	57.11	9.8	41.30	32.73	9.8	29.39	54.42	9.9	14.08	19.91
10.8	26.43	38.27	10.8	14.69	56.91	10.8	41.47	32.49	10.8	29.72	54.34	10.9	14.23	19.59
11.8	26.65	38.15	11.8	15.11	56.75	11.8	41.65	32.29	11.8	30.04	54.26	11.9	14.38	19.29
12.8	26.88	38.06	12.8	15.49	56.61	12.8	41.82	32.11	12.8	30.34	54.16	12.9	14.54	19.00
13.8	27.09	38.00	13.8	15.88	56.50	13.8	41.99	31.96	13.8	30.65	54.03	13.8	14.69	18.76
14.8	27.28	37.95	14.8	16.24	56.39	14.8	42.14	31.82	14.8	30.98	53.91	14.8	14.83	18.53
15.8	27.47	37.90	15.8	16.57	56.28	15.8	42.28	31.68	15.8	31.35	53.77	15.8	14.97	18.31
16.8	27.65	37.82	16.8	16.88	56.17	16.8	42.42	31.53	16.8	31.74	53.65	16.8	15.10	18.09
17.7	27.82	37.74	17.8	17.18	56.06	17.8	42.55	31.37	17.8	32.16	53.55	17.8	15.20	17.87
18.7	27.99	37.65	18.8	17.49	55.93	18.8	42.68	31.20	18.8	32.59	53.47	18.8	15.32	17.64
19.7	28.18	37.55	19.8	17.80	55.78	19.8	42.81	31.03	19.8	33.03	53.42	19.8	15.44	17.37
20.7	28.36	37.44	20.8	18.13	55.64	20.8	42.97	30.85	20.8	33.46	53.39	20.8	15.57	17.11
21.7	28.57	37.34	21.8	18.50	55.49	21.8	43.14	30.66	21.8	33.86	53.37	21.8	15.70	16.84
22.7	28.79	37.25	22.8	18.87	55.35	22.8	43.31	30.47	22.8	34.24	53.36	22.8	15.85	16.57
23.7	28.99	37.19	23.8	19.26	55.24	23.8	43.48	30.31	23.8	34.61	53.35	23.8	16.02	16.32
24.7	29.22	37.14	24.8	19.66	55.14	24.8	43.66	30.17	24.8	34.96	53.31	24.8	16.19	16.09
25.7	29.44	37.12	25.8	20.05	55.05	25.8	43.83	30.05	25.8	35.30	53.28	25.8	16.35	15.86
26.7	29.64	37.11	26.7	20.43	55.01	26.8	44.01	29.95	26.8	35.66	53.24	26.8	16.52	15.66
27.7	29.84	37.12	27.7	20.81	54.98	27.8	44.17	29.87	27.8	36.01	53.19	27.8	16.68	15.47
28.7	30.03	37.14	28.7	21.17	54.94	28.8	44.33	29.80	28.8	36.37	53.14	28.8	16.84	15.29
29.7	30.22	37.15	29.7	21.51	54.91	29.8	44.48	29.73	29.8	36.76	53.10	29.8	16.98	15.14
30.7	30.39	37.15	30.7	21.83	54.87	30.8	44.62	29.66	30.8	37.17	53.06	30.8	17.12	14.99
31.7	30.56	37.16	31.7	22.15	54.82	31.8	44.77	29.57	31.8	37.60	53.04	31.8	17.26	14.82
32.7	30.73	37.15	32.7	22.45	54.78	32.7	44.91	29.49	32.8	38.05	53.04	32.8	17.39	14.66
8.32	-8.26		15.85	-15.82		7.02	-6.95		18.19	+18.16		7.63	-7.57	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
June	8 15	+88 53	June	9 8	-85 20	June	9 25	+81 41	June	9 36	-80 34	June	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
1.2	52.28	9.38	1.2	43.97	25.58	1.2	25.39	49.50	1.2	18.02	37.13	1.2	9.84	61.17
2.1	51.46	9.11	2.2	43.74	25.53	2.2	25.25	49.33	2.2	17.91	37.10	2.2	9.66	61.08
3.1	50.70	8.84	3.2	43.51	25.49	3.2	25.12	49.15	3.2	17.80	37.09	3.2	9.48	60.98
4.1	50.03	8.55	4.2	43.27	25.46	4.2	25.01	48.95	4.2	17.68	37.09	4.2	9.33	60.85
5.1	49.44	8.26	5.2	43.01	25.41	5.2	24.91	48.73	5.2	17.56	37.10	5.2	9.18	60.70
6.1	48.93	7.97	6.2	42.75	25.34	6.2	24.82	48.53	6.2	17.44	37.07	6.2	9.04	60.56
7.1	48.46	7.72	7.2	42.47	25.27	7.2	24.73	48.35	7.2	17.31	37.02	7.2	8.92	60.42
8.1	48.00	7.48	8.2	42.19	25.18	8.2	24.65	48.18	8.2	17.18	36.95	8.2	8.80	60.29
9.1	47.52	7.25	9.2	41.91	25.04	9.2	24.57	48.03	9.2	17.04	36.86	9.2	8.68	60.19
10.1	46.99	7.03	10.2	41.64	24.89	10.2	24.48	47.88	10.2	16.90	36.73	10.2	8.55	60.10
11.1	46.39	6.80	11.2	41.40	24.73	11.2	24.38	47.73	11.2	16.78	36.61	11.2	8.42	60.01
12.1	45.74	6.58	12.2	41.18	24.59	12.2	24.25	47.57	12.2	16.67	36.48	12.2	8.26	59.92
13.1	45.02	6.29	13.2	40.98	24.45	13.2	24.13	47.40	13.2	16.57	36.36	13.2	8.09	59.80
14.1	44.34	5.98	14.2	40.78	24.32	14.2	24.01	47.20	14.2	16.47	36.26	14.2	7.91	59.67
15.1	43.71	5.67	15.1	40.58	24.21	15.2	23.90	46.96	15.2	16.37	36.17	15.2	7.74	59.51
16.1	43.14	5.34	16.1	40.37	24.11	16.2	23.79	46.71	16.2	16.28	36.09	16.2	7.59	59.33
17.1	42.67	5.01	17.1	40.15	24.02	17.2	23.70	46.46	17.2	16.18	36.02	17.2	7.44	59.14
18.1	42.29	4.68	18.1	39.91	23.89	18.2	23.61	46.22	18.2	16.07	35.94	18.2	7.30	58.94
19.1	41.96	4.37	19.1	39.68	23.76	19.2	23.54	45.98	19.2	15.95	35.84	19.2	7.18	58.73
20.1	41.66	4.07	20.1	39.45	23.62	20.1	23.48	45.73	20.2	15.83	35.72	20.2	7.08	58.54
21.1	41.37	3.79	21.1	39.21	23.44	21.1	23.41	45.49	21.2	15.71	35.58	21.2	6.97	58.36
22.1	41.05	3.50	22.1	38.98	23.26	22.1	23.33	45.29	22.1	15.59	35.41	22.2	6.85	58.19
23.1	40.70	3.24	23.1	38.77	23.06	23.1	23.26	45.09	23.1	15.48	35.23	23.2	6.73	58.03
24.1	40.34	2.97	24.1	38.57	22.85	24.1	23.19	44.89	24.1	15.37	35.04	24.2	6.61	57.87
25.1	39.94	2.70	25.1	38.37	22.64	25.1	23.10	44.67	25.1	15.26	34.84	25.2	6.49	57.72
26.1	39.51	2.42	26.1	38.18	22.43	26.1	23.02	44.45	26.1	15.16	34.66	26.2	6.35	57.55
27.1	39.08	2.11	27.1	38.00	22.22	27.1	22.92	44.23	27.1	15.07	34.47	27.2	6.20	57.36
28.1	38.64	1.80	28.1	37.83	22.03	28.1	22.82	43.98	28.1	14.98	34.28	28.2	6.06	57.16
29.1	38.24	1.47	29.1	37.65	21.84	29.1	22.73	43.71	29.1	14.90	34.11	29.2	5.91	56.94
30.1	37.92	1.10	30.1	37.49	21.66	30.1	22.64	43.41	30.1	14.82	33.97	30.2	5.78	56.71
31.1	37.65	0.72	31.1	37.32	21.48	31.1	22.59	43.09	31.1	14.74	33.83	31.2	5.64	56.45
32.1	37.49	0.36	32.1	37.15	21.32	32.1	22.52	42.77	32.1	14.64	33.68	32.2	5.54	56.18
51.39 +51.38			12.31 -12.27			6.92 +6.85			6.11 -6.03			8.19 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m 14 13	° ' -83 17	June	h m 15 3	° ' +87 33	June	h m 15 24	° ' -84 11	June	h m 16 54	° ' +82 10	June	h m 17 16	° ' -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.4	42.80	47.16	1.4	57.14	8.13	1.4	18.11	48.54	1.5	31.10	26.31	1.5	11.32	9.18
2.4	42.75	47.42	2.4	56.82	8.43	2.4	18.10	48.82	2.5	31.07	26.67	2.5	11.38	9.42
3.4	42.70	47.70	3.4	56.47	8.71	3.4	18.11	49.10	3.5	31.05	27.04	3.5	11.45	9.66
4.4	42.66	47.98	4.4	56.11	8.96	4.4	18.12	49.41	4.5	31.01	27.38	4.5	11.52	9.91
5.4	42.61	48.27	5.4	55.74	9.18	5.4	18.13	49.73	5.5	30.98	27.72	5.5	11.61	10.18
6.4	42.56	48.57	6.4	55.38	9.39	6.4	18.14	50.06	6.5	30.93	28.03	6.5	11.69	10.49
7.4	42.48	48.89	7.4	55.05	9.58	7.4	18.11	50.41	7.5	30.89	28.31	7.5	11.75	10.81
8.4	42.39	49.21	8.4	54.74	9.77	8.4	18.08	50.76	8.5	30.86	28.59	8.5	11.80	11.14
9.4	42.30	49.49	9.4	54.45	9.95	9.4	18.03	51.09	9.5	30.83	28.86	9.5	11.85	11.46
10.4	42.17	49.76	10.4	54.17	10.17	10.4	17.95	51.42	10.5	30.80	29.16	10.5	11.88	11.79
11.4	42.05	50.00	11.4	53.88	10.42	11.4	17.87	51.70	11.5	30.78	29.47	11.5	11.89	12.10
12.4	41.95	50.22	12.4	53.56	10.68	12.4	17.80	51.97	12.5	30.75	29.79	12.5	11.90	12.38
13.4	41.85	50.42	13.4	53.21	10.94	13.4	17.74	52.21	13.5	30.72	30.14	13.5	11.93	12.64
14.4	41.76	50.62	14.4	52.82	11.20	14.4	17.68	52.45	14.5	30.68	30.51	14.5	11.95	12.88
15.4	41.68	50.84	15.4	52.40	11.44	15.4	17.65	52.70	15.5	30.62	30.86	15.5	11.98	13.13
16.4	41.60	51.06	16.4	51.95	11.67	16.4	17.61	52.95	16.5	30.56	31.20	16.5	12.02	13.37
17.4	41.53	51.31	17.4	51.50	11.87	17.4	17.57	53.22	17.5	30.49	31.53	17.5	12.07	13.63
18.4	41.45	51.54	18.4	51.04	12.07	18.4	17.54	53.50	18.5	30.41	31.85	18.5	12.11	13.92
19.3	41.36	51.79	19.4	50.62	12.22	19.4	17.49	53.81	19.5	30.35	32.14	19.5	12.15	14.23
20.3	41.25	52.05	20.4	50.21	12.37	20.4	17.42	54.12	20.5	30.29	32.42	20.5	12.18	14.54
21.3	41.13	52.29	21.4	49.83	12.53	21.4	17.34	54.42	21.5	30.21	32.68	21.5	12.21	14.87
22.3	41.00	52.52	22.4	49.45	12.70	22.4	17.25	54.71	22.5	30.15	32.95	22.5	12.22	15.19
23.3	40.86	52.72	23.4	49.07	12.86	23.4	17.13	55.00	23.5	30.09	33.21	23.5	12.22	15.51
24.3	40.72	52.92	24.4	48.70	13.03	24.4	17.01	55.27	24.4	30.03	33.50	24.5	12.21	15.81
25.3	40.58	53.09	25.4	48.31	13.21	25.4	16.89	55.51	25.4	29.97	33.78	25.5	12.20	16.10
26.3	40.44	53.25	26.4	47.90	13.41	26.4	16.79	55.73	26.4	29.91	34.09	26.5	12.17	16.38
27.3	40.31	53.39	27.4	47.48	13.61	27.4	16.68	55.94	27.4	29.83	34.40	27.5	12.15	16.64
28.3	40.17	53.52	28.4	47.02	13.81	28.4	16.57	56.14	28.4	29.75	34.72	28.5	12.14	16.88
29.3	40.07	53.67	29.4	46.54	13.99	29.4	16.47	56.34	29.4	29.67	35.05	29.4	12.14	17.12
30.3	39.96	53.81	30.4	46.03	14.17	30.4	16.39	56.55	30.4	29.57	35.38	30.4	12.14	17.36
31.3	39.86	53.99	31.4	45.51	14.32	31.4	16.31	56.77	31.4	29.47	35.67	31.4	12.15	17.59
32.3	39.75	54.17	32.3	44.98	14.44	32.4	16.23	57.01	32.4	29.37	35.95	32.4	12.16	17.87
8.57	-8.51		23.42	+23.40		9.89	-9.84		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21''.03			+87° 33' 10''.52			-84° 11' 30''.39			+82° 10' 32''.75			-80° 47' 6''.56		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
June	17 59	+86 36	June	18 7	-87 39	June	19 2	+89 0	June	19 30	-89 13	June	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.6	8.97	43.35	1.6	9.48	46.59	1.6	51.42	53.43	1.6	11.00	11.65	1.7	41.99	20.81
2.6	9.02	43.72	2.6	9.78	46.82	2.6	51.96	53.76	2.6	12.23	11.80	2.7	42.14	21.06
3.5	9.06	44.08	3.6	10.10	47.05	3.6	52.42	54.11	3.6	13.52	11.96	3.7	42.28	21.33
4.5	9.06	44.44	4.6	10.46	47.27	4.6	52.78	54.45	4.6	14.91	12.12	4.7	42.40	21.61
5.5	9.05	44.78	5.5	10.82	47.53	5.6	53.07	54.77	5.6	16.37	12.28	5.7	42.53	21.89
6.5	9.03	45.10	6.5	11.19	47.81	6.6	53.30	55.07	6.6	17.86	12.46	6.7	42.63	22.14
7.5	9.01	45.39	7.5	11.52	48.12	7.6	53.51	55.36	7.6	19.32	12.69	7.7	42.73	22.39
8.5	9.01	45.67	8.5	11.82	48.45	8.6	53.73	55.63	8.6	20.72	12.93	8.7	42.83	22.62
9.5	9.01	45.95	9.5	12.09	48.77	9.6	54.03	55.90	9.6	22.01	13.17	9.7	42.93	22.84
10.5	9.04	46.24	10.5	12.30	49.10	10.6	54.39	56.17	10.6	23.15	13.45	10.6	43.03	23.07
11.5	9.07	46.55	11.5	12.47	49.41	11.6	54.79	56.46	11.6	24.16	13.70	11.6	43.16	23.29
12.5	9.09	46.88	12.5	12.62	49.69	12.6	55.22	56.77	12.6	25.08	13.94	12.6	43.28	23.53
13.5	9.10	47.24	13.5	12.77	49.95	13.6	55.63	57.10	13.6	25.96	14.14	13.6	43.40	23.81
14.5	9.11	47.61	14.5	12.94	50.19	14.6	55.99	57.46	14.6	26.87	14.35	14.6	43.53	24.11
15.5	9.08	47.98	15.5	13.14	50.44	15.6	56.26	57.82	15.6	27.82	14.54	15.6	43.64	24.43
16.5	9.04	48.35	16.5	13.36	50.68	16.6	56.44	58.20	16.6	28.86	14.74	16.6	43.75	24.75
17.5	8.96	48.71	17.5	13.59	50.95	17.6	56.54	58.56	17.6	29.97	14.94	17.6	43.85	25.08
18.5	8.87	49.05	18.5	13.83	51.22	18.6	56.56	58.90	18.6	31.10	15.16	18.6	43.95	25.40
19.5	8.78	49.37	19.5	14.06	51.53	19.5	56.56	59.23	19.6	32.24	15.41	19.6	44.04	25.71
20.5	8.69	49.67	20.5	14.25	51.85	20.5	56.56	59.55	20.6	33.34	15.68	20.6	44.12	26.00
21.5	8.61	49.96	21.5	14.42	52.18	21.5	56.56	59.83	21.6	34.39	15.95	21.6	44.19	26.29
22.5	8.53	50.26	22.5	14.56	52.51	22.5	56.59	60.13	22.6	35.32	16.23	22.6	44.27	26.55
23.5	8.47	50.55	23.5	14.66	52.84	23.5	56.67	60.42	23.6	36.17	16.51	23.6	44.35	26.82
24.5	8.42	50.86	24.5	14.72	53.16	24.5	56.75	60.73	24.6	36.93	16.81	24.6	44.44	27.10
25.5	8.36	51.17	25.5	14.77	53.47	25.5	56.87	61.04	25.6	37.60	17.11	25.6	44.52	27.38
26.5	8.30	51.48	26.5	14.81	53.77	26.5	56.98	61.35	26.5	38.20	17.38	26.6	44.61	27.66
27.5	8.21	51.82	27.5	14.84	54.05	27.5	57.09	61.70	27.5	38.76	17.63	27.6	44.69	27.98
28.5	8.13	52.16	28.5	14.86	54.33	28.5	57.15	62.05	28.5	39.31	17.88	28.6	44.79	28.30
29.5	8.03	52.53	29.5	14.90	54.59	29.5	57.13	62.41	29.5	39.90	18.13	29.6	44.87	28.63
30.5	7.90	52.89	30.5	14.97	54.85	30.5	57.05	62.78	30.5	40.54	18.37	30.6	44.95	29.00
31.5	7.74	53.24	31.5	15.07	55.11	31.5	56.88	63.17	31.5	41.26	18.60	31.6	45.03	29.38
32.5	7.56	53.58	32.5	15.18	55.38	32.5	56.60	63.53	32.5	42.04	18.85	32.6	45.09	29.76
16.93 +16.90			24.53 -24.51			58.23 +58.23			73.52 -73.52			7.39 +7.32		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51''.17			-87° 39' 51''.82			+89° 1' 2''.17			-89° 13' 28''.57			+82° 13' 29''.86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			89 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m 21 38	° ' " -83 5	June	h m 22 16	° ' " -86 22	June	h m 22 37	° ' " -81 48	June	h m 23 27	° ' " +86 50	June	h m 23 47	° ' " -82 28
	s "	"		s "	"		s "	"		s "	"		s "	"
1.7	30.73	37.15	1.7	22.45	54.78	1.7	44.91	29.49	1.8	38.05	53.04	1.8	17.39	14.66
2.7	30.90	37.12	2.7	22.77	54.72	2.7	45.05	29.39	2.8	38.49	53.06	2.8	17.53	14.50
3.7	31.08	37.09	3.7	23.09	54.64	3.7	45.20	29.28	3.8	38.94	53.10	3.8	17.67	14.30
4.7	31.27	37.06	4.7	23.45	54.57	4.7	45.36	29.16	4.8	39.37	53.16	4.8	17.82	14.10
5.7	31.49	37.04	5.7	23.81	54.50	5.7	45.53	29.05	5.8	39.75	53.24	5.8	17.99	13.89
6.7	31.70	37.03	6.7	24.22	54.43	6.7	45.71	28.95	6.8	40.14	53.31	6.8	18.16	13.70
7.7	31.92	37.05	7.7	24.62	54.40	7.7	45.89	28.89	7.8	40.51	53.38	7.8	18.34	13.52
8.7	32.13	37.09	8.7	25.03	54.40	8.7	46.08	28.83	8.8	40.84	53.44	8.8	18.53	13.36
9.7	32.35	37.17	9.7	25.42	54.40	9.7	46.26	28.80	9.8	41.19	53.49	9.8	18.73	13.22
10.7	32.54	37.25	10.7	25.80	54.45	10.7	46.44	28.79	10.8	41.54	53.53	10.8	18.90	13.11
11.7	32.71	37.34	11.7	26.14	54.49	11.7	46.59	28.79	11.8	41.91	53.56	11.8	19.07	13.03
12.7	32.87	37.42	12.7	26.46	54.52	12.7	46.72	28.79	12.8	42.31	53.59	12.8	19.22	12.95
13.7	33.04	37.48	13.7	26.76	54.55	13.7	46.87	28.79	13.7	42.74	53.64	13.8	19.36	12.87
14.7	33.18	37.54	14.7	27.04	54.58	14.7	47.00	28.78	14.7	43.19	53.71	14.8	19.50	12.78
15.7	33.34	37.59	15.7	27.35	54.59	15.7	47.14	28.74	15.7	43.64	53.81	15.8	19.64	12.66
16.7	33.51	37.62	16.7	27.65	54.60	16.7	47.29	28.70	16.7	44.07	53.93	16.8	19.79	12.54
17.7	33.68	37.66	17.7	27.98	54.60	17.7	47.46	28.67	17.7	44.49	54.06	17.8	19.95	12.42
18.7	33.87	37.71	18.7	28.35	54.59	18.7	47.62	28.63	18.7	44.88	54.21	18.8	20.13	12.29
19.7	34.07	37.79	19.7	28.72	54.62	19.7	47.79	28.62	19.7	45.26	54.35	19.7	20.31	12.18
20.7	34.26	37.88	20.7	29.09	54.66	20.7	47.97	28.62	20.7	45.61	54.49	20.7	20.48	12.08
21.7	34.46	37.98	21.7	29.46	54.73	21.7	48.15	28.64	21.7	45.95	54.61	21.7	20.67	12.01
22.7	34.64	38.10	22.7	29.83	54.81	22.7	48.31	28.67	22.7	46.28	54.74	22.7	20.86	11.96
23.6	34.82	38.25	23.7	30.17	54.91	23.7	48.48	28.73	23.7	46.62	54.84	23.7	21.04	11.91
24.6	34.98	38.40	24.7	30.50	55.03	24.7	48.63	28.81	24.7	46.98	54.94	24.7	21.21	11.88
25.6	35.13	38.55	25.7	30.82	55.15	25.7	48.77	28.88	25.7	47.34	55.07	25.7	21.38	11.86
26.6	35.27	38.70	26.7	31.11	55.28	26.7	48.91	28.96	26.7	47.72	55.18	26.7	21.54	11.85
27.6	35.42	38.85	27.7	31.39	55.37	27.7	49.04	29.03	27.7	48.12	55.30	27.7	21.68	11.84
28.6	35.55	38.99	28.7	31.66	55.48	28.7	49.17	29.09	28.7	48.52	55.44	28.7	21.83	11.83
29.6	35.68	39.12	29.7	31.93	55.58	29.7	49.30	29.14	29.7	48.94	55.61	29.7	21.98	11.81
30.6	35.82	39.22	30.7	32.21	55.67	30.7	49.43	29.19	30.7	49.35	55.79	30.7	22.13	11.78
31.6	35.98	39.32	31.7	32.50	55.73	31.7	49.57	29.24	31.7	49.76	56.01	31.7	22.28	11.73
32.6	36.15	39.44	32.6	32.82	55.79	32.7	49.73	29.27	32.7	50.13	56.23	32.7	22.45	11.67
8.32      -8.26			15.85    -15.81			7.02      -6.95			18.19    +18.16			7.63      -7.56		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 0 57	° ' +85 48	July	h m 1 30	° ' +88 51	July	h m 1 41	° ' -85 10	July	h m 4 10	° ' +85 20	July	h m 5 35	° ' +85 9
	s	"		s	"		s	"		s	"		s	"
0.8	12.63	41.64	0.8	16.61	39.69	0.8	55.31	46.26	0.9	3.23	7.34	0.9	12.73	28.21
1.8	12.97	41.73	1.8	17.89	39.69	1.8	55.50	46.08	1.9	3.49	7.12	1.9	12.91	27.91
2.8	13.31	41.83	2.8	19.14	39.74	2.8	55.71	45.91	2.9	3.76	6.92	2.9	13.09	27.62
3.8	13.64	41.94	3.8	20.32	39.80	3.8	55.93	45.71	3.9	4.02	6.76	3.9	13.28	27.38
4.8	13.94	42.07	4.8	21.43	39.87	4.8	56.17	45.51	4.9	4.27	6.61	4.9	13.47	27.14
5.8	14.23	42.18	5.8	22.48	39.93	5.8	56.43	45.34	5.9	4.51	6.47	5.9	13.64	26.91
6.7	14.51	42.28	6.8	23.48	39.98	6.8	56.70	45.19	6.9	4.74	6.34	6.9	13.79	26.68
7.7	14.78	42.37	7.8	24.47	40.02	7.8	56.97	45.07	7.9	4.94	6.19	7.9	13.94	26.45
8.7	15.05	42.43	8.8	25.49	40.04	8.8	57.22	44.98	8.9	5.15	6.01	8.9	14.08	26.21
9.7	15.33	42.49	9.8	26.58	40.04	9.8	57.47	44.91	9.9	5.37	5.82	9.9	14.21	25.94
10.7	15.66	42.55	10.8	27.73	40.04	10.8	57.69	44.85	10.9	5.59	5.60	10.9	14.34	25.66
11.7	15.99	42.63	11.8	28.98	40.06	11.8	57.91	44.79	11.9	5.84	5.38	11.9	14.50	25.34
12.7	16.34	42.73	12.8	30.26	40.11	12.8	58.11	44.73	12.9	6.11	5.18	12.9	14.68	25.04
13.7	16.69	42.86	13.8	31.56	40.16	13.8	58.32	44.64	13.9	6.39	4.99	13.9	14.88	24.75
14.7	17.04	43.00	14.8	32.85	40.26	14.8	58.54	44.54	14.9	6.69	4.84	14.9	15.11	24.46
15.7	17.37	43.16	15.7	34.08	40.36	15.8	58.76	44.44	15.9	6.99	4.70	15.9	15.33	24.20
16.7	17.69	43.33	16.7	35.24	40.48	16.8	59.00	44.33	16.9	7.27	4.58	16.9	15.55	23.96
17.7	17.97	43.50	17.7	36.34	40.61	17.8	59.27	44.21	17.9	7.56	4.47	17.9	15.77	23.75
18.7	18.25	43.66	18.7	37.39	40.72	18.7	59.53	44.11	18.9	7.83	4.38	18.9	15.97	23.56
19.7	18.51	43.82	19.7	38.41	40.82	19.7	59.79	44.06	19.8	8.07	4.28	19.9	16.17	23.37
20.7	18.78	43.97	20.7	39.41	40.93	20.7	60.07	44.01	20.8	8.32	4.18	20.9	16.37	23.17
21.7	19.04	44.11	21.7	40.43	41.02	21.7	60.34	43.99	21.8	8.56	4.07	21.9	16.55	22.95
22.7	19.31	44.25	22.7	41.45	41.11	22.7	60.61	43.99	22.8	8.81	3.95	22.9	16.72	22.73
23.7	19.59	44.38	23.7	42.51	41.20	23.7	60.85	43.98	23.8	9.05	3.81	23.9	16.90	22.50
24.7	19.88	44.53	24.7	43.64	41.29	24.7	61.09	44.02	24.8	9.31	3.67	24.9	17.09	22.26
25.7	20.19	44.68	25.7	44.80	41.38	25.7	61.32	44.04	25.8	9.58	3.53	25.9	17.28	22.02
26.7	20.50	44.83	26.7	46.01	41.49	26.7	61.55	44.04	26.8	9.87	3.39	26.9	17.51	21.77
27.7	20.83	45.01	27.7	47.25	41.62	27.7	61.75	44.04	27.8	10.17	3.25	27.9	17.75	21.52
28.7	21.16	45.23	28.7	48.49	41.76	28.7	61.97	44.03	28.8	10.49	3.15	28.9	18.00	21.28
29.7	21.47	45.46	29.7	49.71	41.95	29.7	62.20	44.01	29.8	10.83	3.07	29.9	18.27	21.07
30.7	21.76	45.70	30.7	50.89	42.14	30.7	62.43	43.99	30.8	11.16	3.01	30.9	18.55	20.87
31.7	22.05	45.97	31.7	51.98	42.35	31.7	62.68	43.97	31.8	11.49	2.96	31.9	18.83	20.71
13.69	+13.66		50.32	+50.31		11.90	-11.86		12.29	+12.25		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
July	5 45	−84 49	July	6 46	−80 43	July	7 2	+87 10	July	7 13	+82 34	July	7 15	−86 54
	s	"		s	"		s	"		s	"		s	"
0.9	50.29	40.27	1.0	45.87	41.22	1.0	1.39	53.96	1.0	42.82	29.60	1.0	38.06	14.65
1.9	50.28	39.96	2.0	45.85	40.95	2.0	1.50	53.59	2.0	42.86	29.25	2.0	37.92	14.39
2.9	50.28	39.65	3.0	45.82	40.64	3.0	1.63	53.24	3.0	42.91	28.92	3.0	37.76	14.12
3.9	50.27	39.34	3.9	45.79	40.33	4.0	1.78	52.92	4.0	42.97	28.62	4.0	37.59	13.81
4.9	50.27	39.00	4.9	45.77	40.00	5.0	1.94	52.62	5.0	43.03	28.32	5.0	37.43	13.50
5.9	50.30	38.63	5.9	45.75	39.65	6.0	2.09	52.34	6.0	43.08	28.03	6.0	37.29	13.18
6.9	50.34	38.27	6.9	45.74	39.29	7.0	2.21	52.06	7.0	43.13	27.76	7.0	37.18	12.84
7.9	50.39	37.93	7.9	45.73	38.93	7.9	2.31	51.78	8.0	43.17	27.49	8.0	37.10	12.49
8.9	50.45	37.59	8.9	45.74	38.59	8.9	2.38	51.48	9.0	43.18	27.22	9.0	37.05	12.17
9.9	50.52	37.27	9.9	45.75	38.27	9.9	2.44	51.17	10.0	43.20	26.92	10.0	37.02	11.85
10.9	50.59	36.99	10.9	45.76	37.98	10.9	2.52	50.82	10.9	43.23	26.57	10.9	37.01	11.56
11.9	50.66	36.74	11.9	45.77	37.69	11.9	2.61	50.46	11.9	43.26	26.21	11.9	36.99	11.29
12.9	50.72	36.49	12.9	45.78	37.42	12.9	2.73	50.10	12.9	43.30	25.86	12.9	36.96	11.03
13.9	50.78	36.22	13.9	45.79	37.14	13.9	2.90	49.73	13.9	43.36	25.51	13.9	36.93	10.76
14.9	50.82	35.95	14.9	45.79	36.86	14.9	3.09	49.37	14.9	43.44	25.16	14.9	36.87	10.50
15.9	50.87	35.66	15.9	45.80	36.56	15.9	3.32	49.03	15.9	43.52	24.82	15.9	36.80	10.21
16.9	50.93	35.35	16.9	45.81	36.25	16.9	3.54	48.72	16.9	43.61	24.51	16.9	36.74	9.90
17.9	50.99	35.04	17.9	45.82	35.92	17.9	3.77	48.43	17.9	43.70	24.22	17.9	36.69	9.58
18.9	51.08	34.71	18.9	45.83	35.58	18.9	3.99	48.14	18.9	43.78	23.94	18.9	36.65	9.26
19.9	51.17	34.39	19.9	45.85	35.21	19.9	4.19	47.87	19.9	43.85	23.66	19.9	36.65	8.92
20.9	51.27	34.06	20.9	45.88	34.86	20.9	4.38	47.59	20.9	43.91	23.38	20.9	36.65	8.57
21.9	51.40	33.75	21.9	45.91	34.52	21.9	4.56	47.31	21.9	43.98	23.11	21.9	36.69	8.24
22.9	51.52	33.46	22.9	45.95	34.19	22.9	4.73	47.01	22.9	44.04	22.83	22.9	36.74	7.91
23.9	51.64	33.19	23.9	45.99	33.88	23.9	4.90	46.71	23.9	44.10	22.54	23.9	36.81	7.60
24.9	51.77	32.94	24.9	46.03	33.59	24.9	5.07	46.39	24.9	44.16	22.23	24.9	36.89	7.30
25.9	51.90	32.70	25.9	46.08	33.30	25.9	5.25	46.06	25.9	44.23	21.90	25.9	36.97	7.02
26.9	52.01	32.48	26.9	46.13	33.04	26.9	5.47	45.74	26.9	44.31	21.57	26.9	37.05	6.75
27.9	52.12	32.25	27.9	46.17	32.78	27.9	5.71	45.40	27.9	44.39	21.23	27.9	37.12	6.50
28.9	52.23	32.01	28.9	46.21	32.51	28.9	5.98	45.06	28.9	44.50	20.90	28.9	37.17	6.24
29.9	52.34	31.76	29.9	46.25	32.23	29.9	6.29	44.74	29.9	44.62	20.58	29.9	37.21	5.97
30.9	52.44	31.50	30.9	46.28	31.94	30.9	6.63	44.43	30.9	44.75	20.28	30.9	37.25	5.69
31.9	52.55	31.22	31.9	46.32	31.63	31.9	6.99	44.14	31.9	44.88	19.99	31.9	37.27	5.39
11.09 −11.04			6.20 −6.12			20.33 +20.30			7.74 +7.67			18.51 −18.48		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
−84° 49' 46".89			−80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			−86° 54' 6".70		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 8 15	° ' " +88 52	July	h m 9 8	° ' " −85 20	July	h m 9 25	° ' " +81 41	July	h m 9 36	° ' " −80 34	July	h m 10 21	° ' " +82 58
	s s	"		s s	"		s s	"		s s	"		s s	"
1.1	37.65	60.72	1.1	37.32	21.48	1.1	22.59	43.09	1.1	14.74	33.83	1.2	5.64	56.45
2.1	37.49	60.36	2.1	37.15	21.32	2.1	22.52	42.77	2.1	14.64	33.68	2.2	5.54	56.18
3.1	37.42	60.02	3.1	36.97	21.16	3.1	22.47	42.44	3.1	14.55	33.54	3.2	5.44	55.91
4.1	37.41	59.67	4.1	36.77	20.97	4.1	22.44	42.15	4.1	14.46	33.37	4.1	5.36	55.64
5.1	37.42	59.35	5.1	36.57	20.74	5.1	22.41	41.85	5.1	14.36	33.18	5.1	5.28	55.38
6.1	37.44	59.03	6.1	36.36	20.50	6.1	22.39	41.56	6.1	14.26	32.97	6.1	5.20	55.15
7.1	37.41	58.75	7.1	36.17	20.23	7.1	22.34	41.30	7.1	14.16	32.74	7.1	5.12	54.91
8.1	37.30	58.47	8.1	35.99	19.96	8.1	22.30	41.06	8.1	14.06	32.49	8.1	5.03	54.71
9.0	37.14	58.16	9.1	35.84	19.70	9.1	22.24	40.82	9.1	13.97	32.23	9.1	4.93	54.48
10.0	36.94	57.83	10.1	35.71	19.44	10.1	22.17	40.55	10.1	13.90	31.98	10.1	4.82	54.26
11.0	36.73	57.49	11.1	35.60	19.18	11.1	22.11	40.27	11.1	13.84	31.74	11.1	4.69	54.00
12.0	36.55	57.12	12.1	35.50	18.95	12.1	22.03	39.96	12.1	13.78	31.51	12.1	4.58	53.73
13.0	36.44	56.74	13.1	35.38	18.75	13.1	21.98	39.62	13.1	13.72	31.31	13.1	4.47	53.44
14.0	36.43	56.36	14.1	35.25	18.55	14.1	21.93	39.26	14.1	13.66	31.12	14.1	4.36	53.12
15.0	36.49	55.96	15.1	35.13	18.33	15.1	21.90	38.90	15.1	13.59	30.93	15.1	4.27	52.80
16.0	36.63	55.60	16.1	34.99	18.09	16.1	21.88	38.56	16.1	13.51	30.71	16.1	4.21	52.48
17.0	36.81	55.27	17.1	34.84	17.85	17.1	21.87	38.25	17.1	13.43	30.47	17.1	4.15	52.17
18.0	37.00	54.93	18.1	34.70	17.58	18.1	21.86	37.92	18.1	13.36	30.21	18.1	4.09	51.88
19.0	37.20	54.59	19.1	34.56	17.31	19.1	21.85	37.61	19.1	13.28	29.94	19.1	4.03	51.59
20.0	37.37	54.28	20.1	34.43	17.01	20.1	21.84	37.33	20.1	13.21	29.65	20.1	3.98	51.31
21.0	37.51	53.98	21.1	34.30	16.71	21.1	21.81	37.05	21.1	13.14	29.35	21.1	3.90	51.05
22.0	37.60	53.68	22.0	34.20	16.39	22.1	21.78	36.76	22.1	13.08	29.06	22.1	3.83	50.77
23.0	37.67	53.36	23.0	34.11	16.09	23.1	21.75	36.46	23.1	13.02	28.77	23.1	3.75	50.50
24.0	37.73	53.04	24.0	34.03	15.80	24.1	21.72	36.16	24.1	12.97	28.47	24.1	3.67	50.23
25.0	37.79	52.69	25.0	33.98	15.50	25.1	21.68	35.84	25.1	12.93	28.18	25.1	3.59	49.94
26.0	37.87	52.32	26.0	33.92	15.22	26.1	21.65	35.49	26.1	12.89	27.91	26.1	3.50	49.62
26.9	38.01	51.96	27.0	33.87	14.96	27.0	21.62	35.14	27.1	12.86	27.65	27.1	3.41	49.30
27.9	38.20	51.58	28.0	33.81	14.70	28.0	21.61	34.78	28.1	12.82	27.41	28.1	3.34	48.96
28.9	38.49	51.19	29.0	33.75	14.46	29.0	21.60	34.41	29.0	12.78	27.18	29.1	3.29	48.61
29.9	38.87	50.81	30.0	33.67	14.20	30.0	21.61	34.03	30.0	12.74	26.95	30.1	3.24	48.24
30.9	39.33	50.43	31.0	33.59	13.93	31.0	21.65	33.66	31.0	12.70	26.70	31.1	3.21	47.86
31.9	39.83	50.08	32.0	33.50	13.66	32.0	21.67	33.31	32.0	12.65	26.43	32.1	3.20	47.51
51.26 +51.25			12.30 −12.26			6.92 +6.85			6.11 −6.02			8.18 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			−85° 19' 57".45			+81° 41' 41".50			−80° 34' 6".83			+82° 58' 54".07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 10 59	° ' " -84 9	July	h m 12 14	° ' " +88 9	July	h m 12 46	° ' " -84 40	July	h m 12 48	° ' " +83 51	July	h m 13 27	° ' " -85 22
1.2	48.84	24.93	1.2	27.53	39.67	1.3	12.01	59.23	1.3	32.30	54.24	1.3	25.17	17.98
2.2	48.68	24.89	2.2	26.83	39.53	2.3	11.83	59.31	2.3	32.09	54.16	2.3	24.99	18.13
3.2	48.51	24.85	3.2	26.17	39.37	3.3	11.65	59.40	3.3	31.89	54.07	3.3	24.80	18.29
4.2	48.31	24.80	4.2	25.57	39.21	4.2	11.46	59.50	4.2	31.70	53.97	4.3	24.58	18.45
5.2	48.11	24.75	5.2	25.01	39.07	5.2	11.24	59.58	5.2	31.53	53.86	5.3	24.35	18.59
6.2	47.91	24.66	6.2	24.47	38.92	6.2	11.00	59.65	6.2	31.37	53.76	6.3	24.09	18.71
7.2	47.70	24.52	7.2	23.93	38.80	7.2	10.77	59.68	7.2	31.20	53.68	7.3	23.83	18.81
8.2	47.50	24.38	8.2	23.38	38.67	8.2	10.52	59.69	8.2	31.03	53.62	8.3	23.56	18.88
9.2	47.32	24.23	9.2	22.78	38.57	9.2	10.30	59.68	9.2	30.85	53.57	9.3	23.31	18.92
10.2	47.14	24.07	10.2	22.13	38.46	10.2	10.09	59.65	10.2	30.65	53.52	10.3	23.06	18.94
11.2	47.00	23.92	11.2	21.43	38.34	11.2	9.90	59.62	11.2	30.43	53.46	11.3	22.84	18.97
12.2	46.85	23.78	12.2	20.74	38.20	12.2	9.71	59.60	12.2	30.21	53.38	12.3	22.64	18.99
13.1	46.71	23.68	13.2	20.02	38.03	13.2	9.55	59.59	13.2	29.99	53.28	13.3	22.45	19.03
14.1	46.58	23.57	14.2	19.34	37.84	14.2	9.38	59.60	14.2	29.79	53.14	14.2	22.26	19.09
15.1	46.43	23.44	15.2	18.68	37.64	15.2	9.20	59.61	15.2	29.59	53.00	15.2	22.06	19.15
16.1	46.26	23.32	16.2	18.08	37.43	16.2	9.00	59.61	16.2	29.40	52.85	16.2	21.84	19.21
17.1	46.09	23.19	17.2	17.52	37.21	17.2	8.79	59.62	17.2	29.22	52.69	17.2	21.61	19.28
18.1	45.91	23.05	18.2	17.00	37.00	18.2	8.57	59.62	18.2	29.05	52.53	18.2	21.36	19.33
19.1	45.73	22.87	19.2	16.48	36.80	19.2	8.35	59.60	19.2	28.88	52.37	19.2	21.09	19.37
20.1	45.56	22.68	20.2	15.97	36.61	20.2	8.12	59.55	20.2	28.73	52.22	20.2	20.82	19.39
21.1	45.39	22.48	21.2	15.46	36.43	21.2	7.88	59.49	21.2	28.56	52.09	21.2	20.56	19.38
22.1	45.22	22.25	22.2	14.94	36.25	22.2	7.66	59.41	22.2	28.39	51.96	22.2	20.29	19.35
23.1	45.07	22.03	23.2	14.38	36.07	23.2	7.44	59.32	23.2	28.21	51.84	23.2	20.03	19.31
24.1	44.93	21.81	24.2	13.81	35.89	24.2	7.24	59.22	24.2	28.03	51.70	24.2	19.78	19.26
25.1	44.80	21.59	25.2	13.21	35.70	25.2	7.04	59.09	25.2	27.84	51.58	25.2	19.54	19.21
26.1	44.67	21.37	26.2	12.60	35.51	26.2	6.86	58.98	26.2	27.64	51.44	26.2	19.32	19.15
27.1	44.56	21.16	27.2	11.97	35.27	27.2	6.68	58.90	27.2	27.44	51.27	27.2	19.12	19.10
28.1	44.45	20.98	28.2	11.35	35.02	28.2	6.52	58.82	28.2	27.24	51.08	28.2	18.92	19.07
29.1	44.33	20.81	29.2	10.75	34.76	29.2	6.35	58.75	29.2	27.05	50.87	29.2	18.72	19.05
30.1	44.21	20.63	30.2	10.19	34.48	30.2	6.18	58.69	30.2	26.86	50.64	30.2	18.51	19.04
31.1	44.09	20.46	31.2	9.70	34.18	31.2	5.99	58.63	31.2	26.71	50.41	31.2	18.29	19.04
32.1	43.94	20.27	32.1	9.23	33.87	32.2	5.80	58.57	32.2	26.55	50.16	32.2	18.06	19.03
9.82	-9.77		31.15	+31.14		10.79	-10.75		9.36	+9.30		12.39	-12.35	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m s	° ' "	July	h m s	° ' "	July	h m s	° ' "	July	h m s	° ' "	July	h m s	° ' "
1.5	7.74	53.24	1.5	15.07	55.11	1.5	56.88	3.17	1.5	41.26	18.60	1.6	45.03	29.38
2.5	7.56	53.58	2.5	15.18	55.38	2.5	56.60	3.53	2.5	42.04	18.85	2.6	45.09	29.76
3.5	7.38	53.89	3.5	15.29	55.68	3.5	56.25	3.87	3.5	42.88	19.11	3.6	45.14	30.13
4.5	7.18	54.19	4.5	15.41	55.99	4.5	55.86	4.20	4.5	43.71	19.41	4.6	45.19	30.47
5.5	6.99	54.46	5.5	15.48	56.33	5.5	55.48	4.50	5.5	44.49	19.72	5.6	45.23	30.80
6.5	6.81	54.72	6.5	15.51	56.68	6.5	55.16	4.78	6.5	45.15	20.04	6.6	45.27	31.11
7.5	6.66	54.99	7.5	15.48	57.02	7.5	54.90	5.08	7.5	45.67	20.36	7.6	45.30	31.41
8.5	6.51	55.26	8.5	15.43	57.36	8.5	54.68	5.38	8.5	46.07	20.68	8.6	45.35	31.70
9.5	6.37	55.55	9.5	15.34	57.66	9.5	54.50	5.70	9.5	46.34	20.96	9.6	45.40	32.02
10.4	6.23	55.86	10.5	15.24	57.95	10.5	54.34	6.04	10.5	46.54	21.24	10.6	45.47	32.36
11.4	6.06	56.19	11.5	15.14	58.20	11.5	54.12	6.41	11.5	46.73	21.51	11.6	45.52	32.73
12.4	5.87	56.55	12.4	15.07	58.44	12.5	53.84	6.79	12.5	46.96	21.75	12.6	45.58	33.11
13.4	5.66	56.89	13.4	15.03	58.69	13.5	53.47	7.17	13.5	47.26	22.00	13.6	45.63	33.51
14.4	5.43	57.22	14.4	14.99	58.94	14.5	53.01	7.54	14.5	47.61	22.24	14.6	45.67	33.90
15.4	5.18	57.52	15.4	14.98	59.21	15.5	52.48	7.89	15.5	48.02	22.52	15.6	45.70	34.30
16.4	4.93	57.81	16.4	14.95	59.50	16.5	51.89	8.23	16.5	48.44	22.80	16.5	45.71	34.68
17.4	4.68	58.08	17.4	14.90	59.81	17.5	51.29	8.54	17.5	48.83	23.11	17.5	45.73	35.05
18.4	4.43	58.32	18.4	14.83	60.13	18.5	50.72	8.83	18.5	49.15	23.42	18.5	45.75	35.39
19.4	4.19	58.56	19.4	14.72	60.45	19.5	50.15	9.12	19.5	49.39	23.74	19.5	45.76	35.73
20.4	3.96	58.79	20.4	14.58	60.77	20.5	49.63	9.41	20.5	49.53	24.07	20.5	45.77	36.06
21.4	3.74	59.04	21.4	14.40	61.08	21.5	49.14	9.69	21.5	49.57	24.41	21.5	45.77	36.39
22.4	3.52	59.29	22.4	14.20	61.37	22.5	48.66	9.99	22.5	49.51	24.73	22.5	45.79	36.71
23.4	3.30	59.56	23.4	13.97	61.66	23.5	48.20	10.29	23.5	49.39	25.06	23.5	45.80	37.04
24.4	3.08	59.84	24.4	13.73	61.91	24.5	47.73	10.61	24.5	49.22	25.35	24.5	45.83	37.39
25.4	2.85	60.12	25.4	13.51	62.16	25.5	47.23	10.93	25.5	49.01	25.64	25.5	45.86	37.76
26.4	2.59	60.42	26.4	13.30	62.39	26.4	46.69	11.27	26.5	48.81	25.91	26.5	45.87	38.14
27.4	2.32	60.71	27.4	13.10	62.62	27.4	46.07	11.62	27.5	48.65	26.18	27.5	45.88	38.52
28.4	2.03	61.01	28.4	12.92	62.84	28.4	45.36	11.97	28.5	48.57	26.42	28.5	45.89	38.94
29.4	1.71	61.28	29.4	12.78	63.08	29.4	44.56	12.30	29.5	48.54	26.68	29.5	45.89	39.35
30.4	1.38	61.53	30.4	12.65	63.32	30.4	43.69	12.63	30.5	48.58	26.96	30.5	45.88	39.76
31.4	1.04	61.76	31.4	12.51	63.60	31.4	42.76	12.92	31.5	48.65	27.25	31.5	45.84	40.14
32.4	0.70	61.97	32.4	12.34	63.88	32.4	41.82	13.21	32.5	48.67	27.56	32.5	45.82	40.51
16.94	+16.91		24.56	-24.54		58.40	+58.39		73.73	-73.73		7.39	+7.33	
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 21 38	° ' " -83 5	July	h m 22 16	° ' " -86 22	July	h m 22 37	° ' " -81 48	July	h m 23 27	° ' " +86 50	July	h m 23 47	° ' " -82 28
	s "			s "			s "			s "			s "	
1.6	35.98	39.32	1.7	32.50	55.73	1.7	49.57	29.24	1.7	49.76	56.01	1.7	22.28	11.73
2.6	36.15	39.44	2.6	32.82	55.79	2.7	49.73	29.27	2.7	50.13	56.23	2.7	22.45	11.67
3.6	36.32	39.56	3.6	33.14	55.88	3.7	49.88	29.30	3.7	50.46	56.45	3.7	22.62	11.64
4.6	36.49	39.70	4.6	33.49	55.97	4.7	50.05	29.35	4.7	50.80	56.68	4.7	22.81	11.60
5.6	36.67	39.86	5.6	33.86	56.10	5.7	50.23	29.43	5.7	51.11	56.90	5.7	23.00	11.58
6.6	36.84	40.04	6.6	34.19	56.23	6.7	50.39	29.51	6.7	51.39	57.11	6.7	23.20	11.58
7.6	36.98	40.25	7.6	34.52	56.40	7.6	50.54	29.65	7.7	51.68	57.29	7.7	23.38	11.61
8.6	37.13	40.47	8.6	34.80	56.58	8.6	50.68	29.80	8.7	52.00	57.47	8.7	23.55	11.66
9.6	37.25	40.70	9.6	35.08	56.76	9.6	50.80	29.96	9.7	52.33	57.64	9.7	23.69	11.73
10.6	37.36	40.89	10.6	35.31	56.94	10.6	50.92	30.11	10.7	52.69	57.82	10.7	23.84	11.79
11.6	37.45	41.09	11.6	35.53	57.09	11.6	51.03	30.25	11.7	53.06	58.04	11.7	23.98	11.86
12.6	37.56	41.27	12.6	35.75	57.24	12.6	51.13	30.38	12.7	53.45	58.26	12.7	24.11	11.91
13.6	37.68	41.44	13.6	35.98	57.39	13.6	51.25	30.50	13.7	53.83	58.50	13.7	24.26	11.96
14.6	37.80	41.61	14.6	36.22	57.54	14.6	51.38	30.59	14.7	54.18	58.77	14.7	24.40	11.97
15.6	37.93	41.77	15.6	36.49	57.68	15.6	51.51	30.70	15.7	54.52	59.05	15.7	24.54	12.00
16.6	38.07	41.95	16.6	36.77	57.84	16.6	51.65	30.82	16.7	54.81	59.32	16.7	24.72	12.04
17.6	38.21	42.17	17.6	37.05	58.01	17.6	51.79	30.94	17.7	55.10	59.60	17.7	24.89	12.10
18.6	38.34	42.39	18.6	37.34	58.19	18.6	51.93	31.09	18.7	55.38	59.87	18.7	25.07	12.15
19.6	38.47	42.63	19.6	37.62	58.41	19.6	52.07	31.27	19.7	55.63	60.12	19.7	25.24	12.24
20.6	38.59	42.88	20.6	37.89	58.63	20.6	52.20	31.47	20.6	55.88	60.36	20.7	25.40	12.36
21.6	38.69	43.15	21.6	38.12	58.86	21.6	52.32	31.67	21.6	56.14	60.60	21.7	25.56	12.49
22.6	38.78	43.41	22.6	38.35	59.11	22.6	52.43	31.87	22.6	56.41	60.84	22.7	25.71	12.62
23.6	38.87	43.66	23.6	38.54	59.36	23.6	52.53	32.10	23.6	56.70	61.08	23.7	25.85	12.77
24.6	38.95	43.92	24.6	38.73	59.60	24.6	52.63	32.32	24.6	57.00	61.34	24.7	25.99	12.91
25.6	39.02	44.16	25.6	38.91	59.83	25.6	52.72	32.52	25.6	57.31	61.60	25.6	26.11	13.06
26.6	39.09	44.40	26.6	39.07	60.06	26.6	52.80	32.72	26.6	57.62	61.86	26.6	26.23	13.20
27.6	39.16	44.63	27.6	39.23	60.25	27.6	52.88	32.91	27.6	57.94	62.14	27.6	26.36	13.33
28.6	39.23	44.84	28.6	39.40	60.46	28.6	52.98	33.07	28.6	58.23	62.46	28.6	26.48	13.47
29.5	39.31	45.04	29.6	39.59	60.66	29.6	53.08	33.25	29.6	58.52	62.80	29.6	26.60	13.55
30.5	39.41	45.25	30.6	39.80	60.86	30.6	53.18	33.42	30.6	58.79	63.16	30.6	26.75	13.64
31.5	39.51	45.47	31.6	40.03	61.07	31.6	53.31	33.59	31.6	59.02	63.50	31.6	26.89	13.75
32.5	39.62	45.73	32.6	40.27	61.29	32.6	53.44	33.78	32.6	59.21	63.84	32.6	27.07	13.87
8.32      -8.26			15.85    -15.82			7.02      -6.95			18.20    +18.17			7.63      -7.56		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m 0 57 s	° ' 48	Aug.	h m 1 30 s	° ' +88 51	Aug.	h m 1 42 s	° ' -85 10	Aug.	h m 4 10 s	° ' +85 20	Aug.	h m 5 35 s	° ' +85 9
0.7	22.05	45.97	0.7	51.98	42.35	0.7	2.68	43.97	0.8	11.49	2.96	0.9	18.83	20.71
1.7	22.30	46.22	1.7	53.01	42.56	1.7	2.95	43.95	1.8	11.80	2.93	1.9	19.11	20.56
2.7	22.55	46.47	2.7	53.96	42.76	2.7	3.22	43.95	2.8	12.09	2.92	2.9	19.36	20.42
3.7	22.78	46.70	3.7	54.89	42.96	3.7	3.49	43.98	3.8	12.36	2.89	3.9	19.60	20.27
4.7	23.01	46.90	4.7	55.82	43.11	4.7	3.76	44.02	4.8	12.63	2.85	4.9	19.83	20.12
5.7	23.25	47.10	5.7	56.79	43.26	5.7	4.01	44.10	5.8	12.90	2.80	5.9	20.05	19.94
6.7	23.52	47.31	6.7	57.84	43.41	6.7	4.25	44.18	6.8	13.17	2.72	6.9	20.27	19.76
7.7	23.80	47.51	7.7	58.94	43.56	7.7	4.47	44.26	7.8	13.46	2.64	7.9	20.50	19.54
8.7	24.09	47.74	8.7	60.12	43.73	8.7	4.67	44.35	8.8	13.78	2.54	8.9	20.76	19.32
9.7	24.40	47.97	9.7	61.31	43.92	9.7	4.88	44.44	9.8	14.11	2.47	9.8	21.03	19.12
10.7	24.70	48.23	10.7	62.49	44.14	10.7	5.08	44.50	10.8	14.45	2.41	10.8	21.33	18.92
11.6	24.98	48.51	11.7	63.63	44.38	11.7	5.30	44.56	11.8	14.80	2.39	11.8	21.64	18.74
12.6	25.25	48.81	12.7	64.69	44.62	12.7	5.52	44.61	12.8	15.14	2.39	12.8	21.94	18.60
13.6	25.49	49.10	13.7	65.69	44.88	13.7	5.75	44.67	13.8	15.47	2.41	13.8	22.23	18.47
14.6	25.72	49.40	14.7	66.62	45.13	14.7	6.00	44.75	14.8	15.79	2.44	14.8	22.52	18.37
15.6	25.92	49.69	15.7	67.50	45.38	15.7	6.25	44.83	15.8	16.07	2.47	15.8	22.80	18.27
16.6	26.12	49.96	16.7	68.35	45.63	16.7	6.51	44.95	16.8	16.36	2.50	16.8	23.06	18.17
17.6	26.32	50.23	17.7	69.20	45.85	17.7	6.76	45.08	17.8	16.64	2.53	17.8	23.31	18.07
18.6	26.53	50.48	18.7	70.04	46.05	18.7	7.00	45.22	18.8	16.92	2.54	18.8	23.56	17.95
19.6	26.75	50.74	19.7	70.93	46.25	19.7	7.23	45.36	19.8	17.20	2.53	19.8	23.81	17.83
20.6	26.97	51.01	20.6	71.87	46.46	20.7	7.46	45.53	20.8	17.48	2.52	20.8	24.06	17.69
21.6	27.20	51.27	21.6	72.83	46.68	21.7	7.66	45.72	21.8	17.78	2.51	21.8	24.33	17.55
22.6	27.44	51.53	22.6	73.83	46.91	22.7	7.85	45.90	22.8	18.09	2.49	22.8	24.60	17.42
23.6	27.69	51.81	23.6	74.86	47.16	23.6	8.03	46.07	23.8	18.42	2.48	23.8	24.89	17.27
24.6	27.93	52.12	24.6	75.90	47.42	24.6	8.22	46.23	24.7	18.75	2.48	24.8	25.20	17.14
25.6	28.18	52.44	25.6	76.93	47.71	25.6	8.40	46.38	25.7	19.09	2.52	25.8	25.52	17.04
26.6	28.42	52.79	26.6	77.91	48.02	26.6	8.59	46.50	26.7	19.46	2.58	26.8	25.86	16.93
27.6	28.63	53.14	27.6	78.82	48.34	27.6	8.79	46.63	27.7	19.80	2.67	27.8	26.20	16.86
28.6	28.82	53.49	28.6	79.65	48.68	28.6	9.00	46.76	28.7	20.14	2.78	28.8	26.52	16.81
29.6	28.99	53.84	29.6	80.40	48.99	29.6	9.23	46.90	29.7	20.46	2.89	29.8	26.84	16.78
30.6	29.14	54.18	30.6	81.11	49.29	30.6	9.45	47.06	30.7	20.75	2.99	30.8	27.13	16.75
31.6	29.29	54.52	31.6	81.79	49.58	31.6	9.67	47.24	31.7	21.03	3.09	31.8	27.41	16.71
13.70 +13.66			50.38 +50.37			11.90 -11.86			12.29 +12.25			11.84 +11.80		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "
	8 15	+88 52		9 8	-85 20		9 25	+81 41		9 36	-80 34		10 21	+82 58
0.9	39.83	50.08	1.0	33.50	13.66	1.0	21.67	33.31	1.0	12.65	26.43	1.1	3.20	47.51
1.9	40.35	49.76	2.0	33.40	13.36	2.0	21.70	32.97	2.0	12.60	26.13	2.1	3.20	47.18
2.9	40.83	49.45	3.0	33.31	13.04	3.0	21.73	32.64	3.0	12.54	25.81	3.1	3.18	46.85
3.9	41.26	49.14	4.0	33.25	12.70	4.0	21.74	32.34	4.0	12.50	25.48	4.1	3.15	46.54
4.9	41.62	48.83	5.0	33.20	12.35	5.0	21.75	32.04	5.0	12.46	25.15	5.1	3.12	46.24
5.9	41.94	48.52	6.0	33.18	12.04	6.0	21.74	31.74	6.0	12.44	24.82	6.1	3.07	45.94
6.9	42.21	48.19	7.0	33.18	11.72	7.0	21.74	31.40	7.0	12.43	24.51	7.1	3.01	45.63
7.9	42.51	47.83	8.0	33.18	11.42	8.0	21.73	31.04	8.0	12.43	24.22	8.1	2.95	45.29
8.9	42.86	47.46	8.9	33.19	11.13	9.0	21.73	30.67	9.0	12.42	23.94	9.0	2.90	44.92
9.9	43.29	47.07	9.9	33.19	10.86	10.0	21.74	30.28	10.0	12.42	23.67	10.0	2.86	44.53
10.9	43.81	46.69	10.9	33.20	10.60	11.0	21.77	29.89	11.0	12.41	23.42	11.0	2.84	44.14
11.9	44.40	46.32	11.9	33.19	10.34	12.0	21.81	29.50	12.0	12.39	23.15	12.0	2.83	43.75
12.9	45.04	45.98	12.9	33.16	10.07	12.9	21.86	29.14	13.0	12.38	22.88	13.0	2.82	43.37
13.9	45.71	45.64	13.9	33.13	9.75	13.9	21.91	28.79	14.0	12.36	22.56	14.0	2.83	43.00
14.9	46.38	45.33	14.9	33.11	9.45	14.9	21.96	28.45	15.0	12.34	22.26	15.0	2.85	42.65
15.9	47.03	45.02	15.9	33.10	9.12	15.9	22.01	28.11	15.9	12.32	21.94	16.0	2.86	42.32
16.9	47.65	44.73	16.9	33.11	8.78	16.9	22.05	27.79	16.9	12.31	21.59	17.0	2.86	41.98
17.9	48.23	44.45	17.9	33.12	8.44	17.9	22.09	27.48	17.9	12.30	21.26	18.0	2.86	41.66
18.9	48.79	44.16	18.9	33.15	8.11	18.9	22.13	27.16	18.9	12.30	20.91	19.0	2.86	41.34
19.9	49.31	43.85	19.9	33.19	7.77	19.9	22.15	26.84	19.9	12.30	20.57	20.0	2.85	41.02
20.9	49.83	43.55	20.9	33.25	7.45	20.9	22.18	26.51	20.9	12.32	20.23	21.0	2.83	40.69
21.9	50.36	43.24	21.9	33.32	7.14	21.9	22.21	26.17	21.9	12.34	19.91	22.0	2.81	40.33
22.9	50.92	42.90	22.9	33.40	6.85	22.9	22.24	25.81	22.9	12.37	19.62	23.0	2.79	39.97
23.9	51.54	42.56	23.9	33.48	6.57	23.9	22.27	25.44	23.9	12.40	19.34	24.0	2.78	39.59
24.9	52.24	42.21	24.9	33.54	6.31	24.9	22.31	25.07	24.9	12.43	19.07	25.0	2.78	39.21
25.9	53.01	41.88	25.9	33.60	6.05	25.9	22.38	24.68	25.9	12.46	18.80	26.0	2.81	38.79
26.9	53.88	41.54	26.9	33.65	5.79	26.9	22.46	24.29	26.9	12.47	18.53	26.9	2.84	38.39
27.9	54.80	41.22	27.9	33.69	5.52	27.9	22.55	23.93	27.9	12.48	18.26	27.9	2.89	38.00
28.9	55.75	40.94	28.9	33.73	5.21	28.9	22.64	23.58	28.9	12.49	17.95	28.9	2.95	37.61
29.9	56.68	40.67	29.9	33.77	4.90	29.9	22.73	23.24	29.9	12.49	17.63	29.9	3.00	37.24
30.9	57.57	40.41	30.9	33.82	4.58	30.9	22.82	22.93	30.9	12.51	17.31	30.9	3.05	36.90
31.9	58.38	40.14	31.9	33.91	4.26	31.9	22.89	22.62	31.9	12.54	16.97	31.9	3.10	36.57
51.12	+51.11		12.30	-12.26		6.92	+6.85		6.11	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

<i>η</i> Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			<i>ι</i> Octantis. Mag. 5.4			32 H. Camelopardis. Mag. 5.3			<i>κ</i> Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
Aug.	10 59	−84 9	Aug.	12 13	+88 9	Aug.	12 46	−84 40	Aug.	12 48	+83 51	Aug.	13 27	−85 22
1.1	43.94	20.27	1.1	69.23	33.87	1.2	5.80	58.57	1.2	26.55	50.16	1.2	18.06	19.03
2.1	43.80	20.06	2.1	68.82	33.59	2.2	5.58	58.49	2.2	26.41	49.91	2.2	17.81	19.00
3.1	43.65	19.82	3.1	68.42	33.34	3.2	5.36	58.39	3.2	26.28	49.68	3.2	17.54	18.95
4.1	43.50	19.55	4.1	68.01	33.09	4.2	5.13	58.25	4.2	26.13	49.47	4.2	17.27	18.87
5.1	43.36	19.28	5.1	67.57	32.85	5.2	4.92	58.09	5.2	25.99	49.28	5.2	17.02	18.77
6.1	43.26	19.00	6.1	67.10	32.61	6.2	4.73	57.92	6.2	25.81	49.10	6.2	16.77	18.65
7.1	43.16	18.72	7.1	66.58	32.38	7.2	4.56	57.75	7.2	25.64	48.90	7.2	16.54	18.51
8.1	43.07	18.46	8.1	66.02	32.12	8.2	4.40	57.59	8.2	25.45	48.68	8.2	16.33	18.38
9.1	43.01	18.23	9.1	65.46	31.84	9.1	4.25	57.41	9.2	25.27	48.45	9.2	16.14	18.27
10.1	42.93	18.00	10.1	64.93	31.53	10.1	4.11	57.26	10.1	25.09	48.20	10.2	15.96	18.17
11.1	42.85	17.77	11.1	64.41	31.22	11.1	3.97	57.12	11.1	24.92	47.93	11.2	15.77	18.08
12.1	42.77	17.55	12.1	63.95	30.89	12.1	3.81	57.00	12.1	24.76	47.65	12.2	15.58	17.99
13.1	42.68	17.32	13.1	63.54	30.55	13.1	3.64	56.86	13.1	24.62	47.36	13.2	15.37	17.90
14.1	42.57	17.06	14.1	63.17	30.23	14.1	3.46	56.72	14.1	24.48	47.07	14.2	15.15	17.81
15.1	42.47	16.79	15.1	62.83	29.91	15.1	3.28	56.56	15.1	24.35	46.78	15.2	14.91	17.70
16.1	42.37	16.52	16.1	62.50	29.60	16.1	3.09	56.38	16.1	24.24	46.52	16.2	14.67	17.57
17.1	42.26	16.22	17.1	62.17	29.31	17.1	2.89	56.19	17.1	24.12	46.25	17.2	14.42	17.42
18.1	42.17	15.90	18.1	61.84	29.02	18.1	2.70	55.97	18.1	23.99	46.00	18.2	14.18	17.25
19.0	42.10	15.58	19.1	61.49	28.72	19.1	2.52	55.73	19.1	23.86	45.75	19.2	13.94	17.06
20.0	42.04	15.26	20.1	61.11	28.45	20.1	2.36	55.48	20.1	23.72	45.51	20.1	13.71	16.86
21.0	41.97	14.94	21.1	60.70	28.16	21.1	2.21	55.24	21.1	23.57	45.26	21.1	13.51	16.66
22.0	41.93	14.63	22.1	60.28	27.86	22.1	2.07	55.00	22.1	23.43	45.00	22.1	13.32	16.45
23.0	41.89	14.34	23.1	59.86	27.54	23.1	1.95	54.75	23.1	23.28	44.72	23.1	13.14	16.24
24.0	41.87	14.06	24.1	59.43	27.20	24.1	1.84	54.52	24.1	23.12	44.42	24.1	12.99	16.05
25.0	41.84	13.79	25.1	59.02	26.84	25.1	1.73	54.31	25.1	22.97	44.10	25.1	12.83	15.89
26.0	41.81	13.55	26.1	58.66	26.48	26.1	1.62	54.11	26.1	22.83	43.76	26.1	12.66	15.74
27.0	41.77	13.31	27.1	58.34	26.09	27.1	1.49	53.93	27.1	22.72	43.41	27.1	12.49	15.59
28.0	41.72	13.04	28.1	58.08	25.69	28.1	1.36	53.75	28.1	22.61	43.06	28.1	12.32	15.44
29.0	41.66	12.75	29.1	57.85	25.31	29.1	1.22	53.52	29.1	22.52	42.72	29.1	12.13	15.27
30.0	41.60	12.44	30.1	57.66	24.94	30.1	1.06	53.30	30.1	22.44	42.37	30.1	11.91	15.08
31.0	41.54	12.12	31.1	57.48	24.61	31.1	0.90	53.06	31.1	22.35	42.05	31.1	11.69	14.88
32.0	41.50	11.79	32.1	57.27	24.27	32.1	0.75	52.79	32.1	22.26	41.73	32.1	11.49	14.66
9.82 −9.77			31.12 +31.10			10.79 −10.74			9.35 +9.30			12.39 −12.35		
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
−84° 8' 50".60			+88° 9' 36".08			−84° 40' 22".34			+83° 51' 50".47			−85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "
	14 13	-83 17		15 3	+87 33		15 24	-84 12		16 54	+82 10		17 16	-80 47
1.2	35.28	56.67	1.3	29.26	16.12	1.3	11.88	1.94	1.3	25.58	42.50	1.4	10.90	25.20
2.2	35.12	56.73	2.3	28.73	16.05	2.3	11.70	2.07	2.3	25.42	42.61	2.4	10.82	25.45
3.2	34.94	56.72	3.3	28.23	15.98	3.3	11.50	2.18	3.3	25.28	42.70	3.4	10.75	25.69
4.2	34.75	56.69	4.3	27.74	15.94	4.3	11.30	2.28	4.3	25.13	42.82	4.4	10.66	25.92
5.2	34.56	56.67	5.3	27.23	15.91	5.3	11.08	2.34	5.3	24.99	42.96	5.3	10.56	26.11
6.2	34.39	56.61	6.3	26.72	15.90	6.3	10.88	2.38	6.3	24.84	43.11	6.3	10.45	26.28
7.2	34.22	56.52	7.3	26.16	15.89	7.3	10.69	2.38	7.3	24.69	43.27	7.3	10.36	26.42
8.2	34.08	56.43	8.2	25.59	15.88	8.3	10.51	2.38	8.3	24.52	43.45	8.3	10.26	26.55
9.2	33.93	56.37	9.2	24.99	15.85	9.3	10.34	2.38	9.3	24.36	43.63	9.3	10.17	26.67
10.2	33.79	56.32	10.2	24.37	15.81	10.3	10.18	2.41	10.3	24.19	43.77	10.3	10.09	26.79
11.2	33.66	56.27	11.2	23.76	15.72	11.3	10.03	2.45	11.3	24.00	43.90	11.3	10.02	26.93
12.2	33.53	56.22	12.2	23.16	15.63	12.3	9.88	2.50	12.3	23.83	44.01	12.3	9.95	27.11
13.2	33.39	56.18	13.2	22.58	15.53	13.2	9.70	2.54	13.3	23.65	44.11	13.3	9.87	27.27
14.2	33.22	56.15	14.2	22.03	15.41	14.2	9.52	2.58	14.3	23.49	44.19	14.3	9.79	27.45
15.2	33.05	56.11	15.2	21.51	15.29	15.2	9.32	2.63	15.3	23.32	44.24	15.3	9.69	27.63
16.2	32.87	56.02	16.2	21.00	15.18	16.2	9.13	2.66	16.3	23.15	44.29	16.3	9.59	27.81
17.2	32.70	55.95	17.2	20.51	15.08	17.2	8.90	2.67	17.3	23.00	44.35	17.3	9.48	27.95
18.2	32.51	55.82	18.2	20.01	14.98	18.2	8.68	2.67	18.3	22.85	44.41	18.3	9.35	28.10
19.2	32.32	55.70	19.2	19.51	14.89	19.2	8.46	2.65	19.3	22.68	44.49	19.3	9.22	28.23
20.2	32.16	55.57	20.2	19.01	14.81	20.2	8.25	2.61	20.3	22.51	44.57	20.3	9.10	28.33
21.2	32.01	55.42	21.2	18.48	14.72	21.2	8.05	2.55	21.3	22.35	44.66	21.3	8.97	28.42
22.2	31.86	55.25	22.2	17.93	14.65	22.2	7.85	2.50	22.3	22.18	44.76	22.3	8.85	28.50
23.2	31.72	55.09	23.2	17.35	14.57	23.2	7.66	2.43	23.3	22.01	44.86	23.3	8.75	28.56
24.2	31.59	54.94	24.2	16.76	14.46	24.2	7.49	2.36	24.3	21.82	44.95	24.3	8.64	28.62
25.2	31.45	54.80	25.2	16.16	14.32	25.2	7.33	2.29	25.3	21.64	45.01	25.3	8.54	28.69
26.2	31.34	54.69	26.2	15.57	14.17	26.2	7.17	2.26	26.3	21.45	45.06	26.3	8.46	28.77
27.2	31.21	54.59	27.2	15.00	13.98	27.2	7.01	2.24	27.3	21.26	45.08	27.3	8.37	28.86
28.2	31.07	54.47	28.2	14.44	13.79	28.2	6.84	2.22	28.3	21.07	45.08	28.3	8.27	28.99
29.2	30.92	54.38	29.2	13.93	13.58	29.2	6.67	2.19	29.3	20.89	45.06	29.3	8.18	29.11
30.2	30.76	54.24	30.2	13.45	13.38	30.2	6.46	2.15	30.3	20.71	45.03	30.3	8.05	29.21
31.2	30.60	54.11	31.2	12.98	13.18	31.2	6.24	2.10	31.3	20.54	45.00	31.3	7.93	29.32
32.1	30.43	53.95	32.2	12.52	13.00	32.2	6.02	2.01	32.3	20.37	45.00	32.3	7.80	29.39
8.57	-8.51		23.43	+23.41		9.90	-9.85		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	27°.793		15 <sup>h</sup> 3 <sup>m</sup>	41°.175		15 <sup>h</sup> 23 <sup>m</sup>	56°.594		16 <sup>h</sup> 54 <sup>m</sup>	25°.488		17 <sup>h</sup> 15 <sup>m</sup>	54°.896	
-88° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m 17 58	° ' +86 37	Aug.	h m 18 7	° ' -87 40	Aug.	h m 19 2	° ' +89 1	Aug.	h m 19 30	° ' -89 13	Aug.	h m 20 48	° ' +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
1.4	60.70	1.97	1.4	12.34	3.88	1.4	41.82	13.21	1.5	48.67	27.56	1.5	45.82	40.51
2.4	60.37	2.17	2.4	12.14	4.17	2.4	40.92	13.48	2.4	48.61	27.88	2.5	45.78	40.85
3.4	60.06	2.36	3.4	11.90	4.47	3.4	40.06	13.72	3.4	48.42	28.21	3.5	45.75	41.18
4.4	59.77	2.55	4.4	11.62	4.76	4.4	39.28	13.99	4.4	48.09	28.54	4.5	45.72	41.51
5.4	59.49	2.77	5.4	11.29	5.01	5.4	38.54	14.25	5.4	47.65	28.84	5.5	45.70	41.83
6.4	59.21	2.99	6.4	10.95	5.25	6.4	37.82	14.52	6.4	47.09	29.13	6.5	45.69	42.19
7.4	58.90	3.23	7.4	10.61	5.44	7.4	37.09	14.84	7.4	46.51	29.40	7.5	45.67	42.55
8.4	58.59	3.47	8.4	10.28	5.64	8.4	36.32	15.16	8.4	45.93	29.65	8.5	45.66	42.93
9.4	58.27	3.73	9.4	10.00	5.82	9.4	35.44	15.49	9.4	45.43	29.89	9.5	45.65	43.33
10.4	57.90	3.97	10.4	9.72	6.00	10.4	34.49	15.81	10.4	44.98	30.13	10.5	45.61	43.74
11.4	57.53	4.21	11.4	9.47	6.20	11.4	33.46	16.10	11.4	44.59	30.38	11.5	45.57	44.15
12.4	57.16	4.41	12.4	9.21	6.42	12.4	32.37	16.40	12.4	44.22	30.65	12.5	45.53	44.54
13.4	56.77	4.58	13.4	8.94	6.66	13.4	31.26	16.66	13.4	43.85	30.93	13.5	45.47	44.91
14.4	56.40	4.74	14.4	8.64	6.89	14.4	30.17	16.89	14.4	43.42	31.22	14.5	45.41	45.26
15.4	56.03	4.89	15.4	8.32	7.13	15.4	29.08	17.12	15.4	42.92	31.52	15.5	45.35	45.60
16.3	55.68	5.03	16.4	7.96	7.38	16.4	28.05	17.34	16.4	42.32	31.82	16.5	45.29	45.93
17.3	55.34	5.18	17.4	7.58	7.61	17.4	27.05	17.57	17.4	41.62	32.12	17.5	45.23	46.23
18.3	55.01	5.33	18.3	7.16	7.82	18.4	26.08	17.80	18.4	40.82	32.42	18.5	45.17	46.55
19.3	54.67	5.50	19.3	6.72	8.02	19.4	25.14	18.04	19.4	39.95	32.69	19.5	45.11	46.88
20.3	54.33	5.68	20.3	6.28	8.20	20.4	24.20	18.28	20.4	39.02	32.95	20.5	45.06	47.22
21.3	54.00	5.87	21.3	5.84	8.35	21.4	23.23	18.55	21.4	38.05	33.19	21.5	45.01	47.57
22.3	53.63	6.06	22.3	5.40	8.50	22.4	22.24	18.83	22.4	37.10	33.42	22.4	44.96	47.93
23.3	53.27	6.24	23.3	4.98	8.66	23.4	21.19	19.10	23.4	36.15	33.66	23.4	44.91	48.29
24.3	52.87	6.43	24.3	4.59	8.79	24.4	20.06	19.37	24.4	35.28	33.85	24.4	44.86	48.68
25.3	52.46	6.61	25.3	4.22	8.90	25.4	18.84	19.64	25.4	34.46	34.04	25.4	44.78	49.06
26.3	52.03	6.76	26.3	3.88	9.05	26.4	17.55	19.89	26.4	33.72	34.26	26.4	44.70	49.45
27.3	51.60	6.90	27.3	3.55	9.20	27.4	16.21	20.12	27.4	33.03	34.48	27.4	44.61	49.82
28.3	51.17	7.00	28.3	3.19	9.38	28.4	14.85	20.31	28.4	32.33	34.72	28.4	44.51	50.15
29.3	50.74	7.08	29.3	2.82	9.56	29.4	13.48	20.51	29.4	31.57	35.00	29.4	44.41	50.48
30.3	50.33	7.14	30.3	2.41	9.74	30.4	12.19	20.68	30.4	30.71	35.26	30.4	44.31	50.79
31.3	49.94	7.22	31.3	1.94	9.91	31.3	10.95	20.85	31.4	29.71	35.52	31.4	44.21	51.08
32.3	49.56	7.31	32.3	1.45	10.06	32.3	9.78	21.02	32.4	28.60	35.77	32.4	44.12	51.37
16.95 +16.92			24.58 -24.56			58.55 +58.54			73.97 -73.97			7.40 +7.33		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Aug.	21 38	−83 5	Aug.	22 16	−86 23	Aug.	22 37	−81 48	Aug.	23 27	+86 51	Aug.	23 47	−82 28
	s	"		s	"		s	"		s	"		s	"
1.5	39.62	45.73	1.6	40.27	1.29	1.6	53.44	33.78	1.6	59.21	3.84	1.6	27.07	13.87
2.5	39.72	45.99	2.6	40.49	1.53	2.6	53.54	34.00	2.6	59.39	4.16	2.6	27.22	14.01
3.5	39.82	46.27	3.6	40.70	1.80	3.6	53.65	34.24	3.6	59.58	4.46	3.6	27.37	14.18
4.5	39.88	46.59	4.6	40.89	2.07	4.6	53.75	34.51	4.6	59.76	4.75	4.6	27.51	14.37
5.5	39.93	46.90	5.6	41.03	2.36	5.6	53.83	34.77	5.6	59.97	5.04	5.6	27.64	14.59
6.5	39.97	47.19	6.6	41.14	2.65	6.6	53.89	35.03	6.6	60.20	5.33	6.6	27.75	14.80
7.5	39.99	47.47	7.6	41.24	2.94	7.6	53.95	35.29	7.6	60.45	5.63	7.6	27.85	14.99
8.5	40.02	47.75	8.5	41.33	3.18	8.6	54.00	35.53	8.6	60.72	5.95	8.6	27.94	15.20
9.5	40.05	47.98	9.5	41.42	3.43	9.6	54.06	35.75	9.6	60.97	6.31	9.6	28.03	15.38
10.5	40.08	48.21	10.5	41.53	3.66	10.6	54.12	35.98	10.6	61.22	6.67	10.6	28.13	15.57
11.5	40.13	48.44	11.5	41.65	3.89	11.6	54.20	36.19	11.6	61.45	7.04	11.6	28.23	15.74
12.5	40.18	48.68	12.5	41.79	4.12	12.6	54.28	36.40	12.6	61.63	7.42	12.6	28.36	15.89
13.5	40.24	48.96	13.5	41.93	4.39	13.5	54.36	36.63	13.6	61.80	7.80	13.6	28.48	16.08
14.5	40.29	49.24	14.5	42.08	4.67	14.5	54.44	36.88	14.6	61.94	8.15	14.6	28.61	16.27
15.5	40.34	49.54	15.5	42.22	4.95	15.5	54.52	37.15	15.6	62.07	8.51	15.6	28.73	16.48
16.5	40.39	49.86	16.5	42.34	5.26	16.5	54.59	37.44	16.6	62.20	8.84	16.6	28.85	16.70
17.5	40.41	50.19	17.5	42.44	5.58	17.5	54.64	37.75	17.6	62.32	9.16	17.6	28.95	16.96
18.5	40.42	50.52	18.5	42.53	5.91	18.5	54.69	38.06	18.6	62.45	9.49	18.6	29.06	17.22
19.5	40.43	50.83	19.5	42.57	6.25	19.5	54.74	38.37	19.6	62.59	9.80	19.6	29.15	17.49
20.5	40.42	51.14	20.5	42.61	6.57	20.5	54.77	38.68	20.6	62.75	10.13	20.6	29.23	17.77
21.5	40.40	51.44	21.5	42.63	6.88	21.5	54.80	38.97	21.6	62.92	10.45	21.6	29.31	18.04
22.5	40.38	51.73	22.5	42.64	7.16	22.5	54.82	39.25	22.6	63.09	10.80	22.6	29.37	18.31
23.5	40.36	52.00	23.5	42.65	7.45	23.5	54.84	39.53	23.6	63.27	11.16	23.6	29.43	18.57
24.5	40.34	52.26	24.5	42.65	7.72	24.5	54.87	39.78	24.6	63.45	11.54	24.6	29.49	18.81
25.5	40.34	52.52	25.5	42.69	7.98	25.5	54.89	40.03	25.6	63.59	11.94	25.6	29.57	19.03
26.5	40.34	52.77	26.5	42.72	8.22	26.5	54.93	40.27	26.5	63.72	12.34	26.6	29.64	19.24
27.5	40.35	53.03	27.5	42.78	8.49	27.5	54.96	40.51	27.5	63.81	12.76	27.6	29.72	19.46
28.5	40.37	53.31	28.5	42.86	8.76	28.5	55.01	40.78	28.5	63.87	13.18	28.6	29.81	19.69
29.5	40.38	53.60	29.5	42.92	9.06	29.5	55.06	41.06	29.5	63.93	13.57	29.6	29.91	19.94
30.5	40.39	53.92	30.5	42.97	9.37	30.5	55.10	41.38	30.5	63.96	13.94	30.6	30.01	20.21
31.5	40.36	54.23	31.5	42.99	9.70	31.5	55.13	41.69	31.5	63.99	14.30	31.5	30.09	20.49
32.5	40.33	54.55	32.5	43.00	10.03	32.5	55.14	42.02	32.5	64.04	14.66	32.5	30.14	20.81
8.32 −8.26			15.86 −15.83			7.02 −6.95			18.21 +18.18			7.63 −7.56		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
−83° 6' 6".99			−86° 23' 27".13			−81° 49' 2".34			+86° 50' 58".89			−82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	0 57	+85 48	Sept.	1 31	+88 51	Sept.	1 42	-85 10	Sept.	4 10	+85 20	Sept.	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.6	29.29	54.52	0.6	21.79	49.58	0.6	9.67	47.24	0.7	21.03	3.09	0.8	27.41	16.71
1.6	29.44	54.82	1.6	22.51	49.86	1.6	9.87	47.47	1.7	21.31	3.17	1.8	27.68	16.67
2.6	29.62	55.11	2.6	23.28	50.12	2.6	10.06	47.70	2.7	21.59	3.23	2.8	27.95	16.61
3.6	29.81	55.42	3.6	24.11	50.38	3.6	10.24	47.95	3.7	21.90	3.28	3.8	28.23	16.53
4.6	30.01	55.73	4.6	25.00	50.66	4.6	10.39	48.19	4.7	22.21	3.32	4.8	28.51	16.43
5.6	30.24	56.05	5.6	25.94	50.94	5.6	10.52	48.42	5.7	22.54	3.36	5.8	28.84	16.33
6.6	30.44	56.41	6.6	26.85	51.26	6.6	10.66	48.65	6.7	22.88	3.44	6.8	29.16	16.24
7.6	30.65	56.77	7.6	27.74	51.57	7.6	10.80	48.85	7.7	23.22	3.53	7.8	29.50	16.19
8.6	30.83	57.15	8.6	28.56	51.92	8.6	10.96	49.06	8.7	23.57	3.65	8.8	29.85	16.17
9.6	30.99	57.53	9.6	29.30	52.28	9.6	11.13	49.25	9.7	23.91	3.78	9.8	30.19	16.16
10.6	31.13	57.90	10.6	29.97	52.65	10.6	11.30	49.45	10.7	24.22	3.93	10.8	30.52	16.16
11.6	31.25	58.27	11.6	30.57	53.00	11.6	11.47	49.66	11.7	24.51	4.09	11.8	30.81	16.17
12.6	31.36	58.64	12.6	31.12	53.34	12.6	11.65	49.90	12.7	24.81	4.24	12.8	31.11	16.20
13.6	31.46	58.98	13.6	31.68	53.67	13.6	11.83	50.16	13.7	25.08	4.39	13.8	31.40	16.21
14.6	31.57	59.32	14.6	32.22	53.98	14.6	11.98	50.43	14.7	25.35	4.53	14.8	31.68	16.22
15.6	31.67	59.65	15.6	32.78	54.30	15.6	12.14	50.72	15.7	25.61	4.67	15.7	31.96	16.23
16.6	31.80	59.97	16.6	33.37	54.58	16.6	12.28	51.01	16.7	25.88	4.78	16.7	32.23	16.20
17.5	31.93	60.30	17.6	34.00	54.86	17.6	12.41	51.31	17.7	26.16	4.89	17.7	32.51	16.17
18.5	32.06	60.64	18.6	34.65	55.17	18.6	12.51	51.61	18.7	26.45	4.99	18.7	32.81	16.16
19.5	32.20	60.98	19.6	35.35	55.49	19.6	12.61	51.91	19.7	26.75	5.12	19.7	33.12	16.14
20.5	32.35	61.35	20.6	36.06	55.83	20.6	12.71	52.19	20.7	27.06	5.24	20.7	33.44	16.13
21.5	32.50	61.72	21.6	36.77	56.19	21.6	12.79	52.48	21.7	27.38	5.38	21.7	33.77	16.11
22.5	32.64	62.13	22.6	37.41	56.56	22.6	12.88	52.73	22.7	27.72	5.56	22.7	34.11	16.14
23.5	32.75	62.54	23.6	38.00	56.97	23.6	12.98	52.97	23.7	28.05	5.75	23.7	34.46	16.19
24.5	32.84	62.95	24.6	38.51	57.39	24.6	13.08	53.21	24.7	28.35	5.98	24.7	34.80	16.27
25.5	32.90	63.36	25.6	38.95	57.78	25.6	13.21	53.46	25.7	28.64	6.20	25.7	35.14	16.36
26.5	32.96	63.75	26.5	39.29	58.16	26.6	13.33	53.73	26.7	28.93	6.42	26.7	35.46	16.45
27.5	33.00	64.13	27.5	39.62	58.53	27.6	13.46	54.00	27.7	29.17	6.65	27.7	35.74	16.54
28.5	33.04	64.50	28.5	39.95	58.87	28.5	13.56	54.30	28.7	29.42	6.85	28.7	36.03	16.62
29.5	33.10	64.84	29.5	40.33	59.22	29.5	13.66	54.63	29.7	29.66	7.04	29.7	36.29	16.68
30.5	33.17	65.18	30.5	40.77	59.54	30.5	13.73	54.95	30.6	29.93	7.21	30.7	36.57	16.72
31.5	33.26	65.54	31.5	41.26	59.86	31.5	13.78	55.29	31.6	30.19	7.37	31.7	36.85	16.75
13.71 +13.67			50.49 +50.48			11.90 -11.86			12.29 +12.25			11.84 +11.80		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 5 45	° ' " -84 49	Sept.	h m 6 46	° ' " -80 43	Sept.	h m 7 2	° ' " +87 10	Sept.	h m 7 13	° ' " +82 34	Sept.	h m 7 15	° ' " -86 53
	s "	"		s "	"		s "	"		s "	"		s "	"
0.8	58.15	25.32	0.8	48.84	23.95	0.8	18.39	36.45	0.9	49.16	12.18	0.9	43.10	57.26
1.8	58.38	25.21	1.8	48.96	23.75	1.8	18.79	36.27	1.9	49.31	11.99	1.9	43.41	57.02
2.8	58.62	25.10	2.8	49.08	23.58	2.8	19.18	36.07	2.9	49.46	11.79	2.9	43.74	56.82
3.8	58.86	25.05	3.8	49.20	23.44	3.8	19.58	35.86	3.8	49.61	11.57	3.9	44.08	56.63
4.8	59.09	25.00	4.8	49.32	23.33	4.8	20.00	35.65	4.8	49.76	11.33	4.8	44.41	56.48
5.8	59.31	24.97	5.8	49.45	23.22	5.8	20.45	35.42	5.8	49.93	11.09	5.8	44.73	56.34
6.8	59.51	24.93	6.8	49.56	23.11	6.8	20.93	35.20	6.8	50.12	10.84	6.8	45.03	56.21
7.8	59.72	24.89	7.8	49.67	22.99	7.8	21.43	34.99	7.8	50.30	10.61	7.8	45.32	56.07
8.8	59.93	24.83	8.8	49.77	22.86	8.8	21.95	34.79	8.8	50.50	10.41	8.8	45.61	55.91
9.8	60.13	24.75	9.8	49.88	22.72	9.8	22.47	34.63	9.8	50.71	10.24	9.8	45.89	55.74
10.8	60.36	24.67	10.8	50.00	22.56	10.8	22.99	34.48	10.8	50.91	10.09	10.8	46.19	55.56
11.8	60.58	24.58	11.8	50.13	22.39	11.8	23.49	34.35	11.8	51.10	9.94	11.8	46.50	55.37
12.8	60.82	24.49	12.8	50.25	22.23	12.8	23.97	34.23	12.8	51.28	9.80	12.8	46.82	55.18
13.8	61.07	24.43	13.8	50.38	22.08	13.8	24.43	34.11	13.8	51.45	9.67	13.8	47.18	55.00
14.8	61.32	24.38	14.8	50.50	21.94	14.8	24.88	33.99	14.8	51.63	9.54	14.8	47.54	54.83
15.8	61.57	24.37	15.8	50.64	21.83	15.8	25.32	33.86	15.8	51.79	9.40	15.8	47.92	54.67
16.8	61.82	24.35	16.8	50.78	21.73	16.8	25.76	33.73	16.8	51.95	9.24	16.8	48.31	54.52
17.8	62.08	24.36	17.8	50.92	21.66	17.8	26.20	33.58	17.8	52.12	9.07	17.8	48.70	54.41
18.7	62.33	24.40	18.8	51.05	21.60	18.8	26.65	33.43	18.8	52.29	8.90	18.8	49.10	54.31
19.7	62.57	24.44	19.8	51.19	21.57	19.8	27.12	33.27	19.8	52.46	8.72	19.8	49.49	54.22
20.7	62.80	24.48	20.8	51.32	21.54	20.8	27.61	33.11	20.8	52.65	8.54	20.8	49.86	54.16
21.7	63.02	24.52	21.8	51.46	21.50	21.8	28.15	32.95	21.8	52.85	8.37	21.8	50.21	54.09
22.7	63.23	24.56	22.8	51.58	21.46	22.8	28.70	32.81	22.8	53.06	8.21	22.8	50.55	54.01
23.7	63.45	24.59	23.8	51.70	21.41	23.8	29.27	32.70	23.8	53.28	8.07	23.8	50.88	53.93
24.7	63.66	24.60	24.8	51.83	21.34	24.8	29.85	32.61	24.8	53.51	7.97	24.8	51.21	53.84
25.7	63.88	24.60	25.8	51.95	21.26	25.8	30.41	32.55	25.8	53.73	7.88	25.8	51.54	53.72
26.7	64.11	24.60	26.8	52.07	21.18	26.8	30.94	32.50	26.8	53.93	7.81	26.8	51.90	53.61
27.7	64.35	24.61	27.8	52.21	21.12	27.8	31.46	32.45	27.8	54.13	7.74	27.8	52.28	53.50
28.7	64.61	24.65	28.8	52.34	21.07	28.8	31.93	32.39	28.8	54.31	7.67	28.8	52.69	53.40
29.7	64.86	24.72	29.8	52.49	21.05	29.8	32.40	32.32	29.8	54.49	7.58	29.8	53.10	53.35
30.7	65.11	24.81	30.8	52.63	21.06	30.8	32.86	32.24	30.8	54.66	7.47	30.8	53.54	53.30
31.7	65.35	24.94	31.8	52.78	21.10	31.8	33.35	32.13	31.8	54.84	7.35	31.8	53.97	53.30
11.08 -11.04			6.20 -6.12			20.30 +20.27			7.73 +7.67			18.48 -18.45		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119 Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 8 15	° ' " +88 52	Sept.	h m 9 8	° ' " -85 19	Sept.	h m 9 25	° ' " +81 41	Sept.	h m 9 36	° ' " -80 34	Sept.	h m 10 21	° ' " +82 58
	s	"		s	"		s	"		s	"		s	"
0.9	58.38	40.14	0.9	33.91	64.26	0.9	22.89	22.62	0.9	12.54	16.97	0.9	3.10	36.57
1.9	59.13	39.87	1.9	34.00	63.95	1.9	22.95	22.31	1.9	12.57	16.64	1.9	3.13	36.24
2.9	59.85	39.59	2.9	34.12	63.63	2.9	23.00	22.00	2.9	12.62	16.33	2.9	3.15	35.87
3.9	60.56	39.29	3.9	34.25	63.35	3.9	23.05	21.67	3.9	12.67	16.04	3.9	3.16	35.52
4.9	61.30	38.98	4.9	34.39	63.09	4.9	23.11	21.30	4.9	12.73	15.76	4.9	3.17	35.15
5.9	62.11	38.66	5.9	34.53	62.85	5.9	23.18	20.93	5.9	12.78	15.49	5.9	3.19	34.74
6.9	63.01	38.33	6.9	34.65	62.63	6.9	23.26	20.55	6.9	12.84	15.25	6.9	3.23	34.33
7.9	63.97	38.04	7.9	34.77	62.41	7.9	23.36	20.17	7.9	12.89	15.01	7.9	3.28	33.93
8.9	65.00	37.74	8.9	34.87	62.18	8.9	23.45	19.80	8.9	12.94	14.74	8.9	3.35	33.52
9.9	66.06	37.46	9.9	34.98	61.90	9.9	23.56	19.47	9.9	12.99	14.46	9.9	3.43	33.14
10.9	67.13	37.20	10.9	35.09	61.64	10.9	23.67	19.15	10.9	13.03	14.19	10.9	3.52	32.76
11.9	68.16	36.96	11.9	35.19	61.35	11.9	23.78	18.83	11.9	13.08	13.91	11.9	3.60	32.41
12.9	69.18	36.74	12.9	35.32	61.06	12.9	23.88	18.54	12.9	13.12	13.61	12.9	3.68	32.07
13.9	70.15	36.52	13.9	35.46	60.76	13.9	23.98	18.26	13.9	13.18	13.30	13.9	3.75	31.76
14.9	71.08	36.29	14.9	35.61	60.46	14.9	24.07	17.98	14.9	13.23	13.00	14.9	3.81	31.43
15.9	71.99	36.07	15.9	35.78	60.18	15.9	24.16	17.68	15.9	13.31	12.68	15.9	3.87	31.11
16.9	72.87	35.83	16.9	35.96	59.90	16.9	24.24	17.38	16.9	13.39	12.39	16.9	3.93	30.78
17.9	73.75	35.60	17.9	36.14	59.66	17.9	24.33	17.07	17.9	13.47	12.10	17.9	3.98	30.43
18.9	74.66	35.35	18.9	36.34	59.42	18.9	24.41	16.75	18.9	13.55	11.84	18.9	4.04	30.07
19.8	75.60	35.09	19.9	36.54	59.21	19.9	24.50	16.42	19.9	13.64	11.60	19.9	4.10	29.70
20.8	76.61	34.81	20.9	36.73	59.01	20.9	24.60	16.09	20.9	13.72	11.36	20.9	4.17	29.34
21.8	77.70	34.54	21.9	36.91	58.82	21.9	24.71	15.74	21.9	13.81	11.14	21.9	4.25	28.94
22.8	78.85	34.29	22.9	37.08	58.62	22.9	24.84	15.39	22.9	13.90	10.93	22.9	4.35	28.55
23.8	80.07	34.05	23.9	37.25	58.43	23.9	24.98	15.06	23.9	13.98	10.73	23.9	4.46	28.16
24.8	81.34	33.84	24.9	37.41	58.22	24.9	25.12	14.76	24.9	14.05	10.51	24.9	4.58	27.79
25.8	82.59	33.65	25.9	37.57	58.00	25.9	25.26	14.48	25.9	14.12	10.29	25.9	4.71	27.44
26.8	83.82	33.47	26.9	37.73	57.76	26.9	25.40	14.20	26.9	14.20	10.05	26.9	4.84	27.11
27.8	84.96	33.30	27.9	37.91	57.52	27.9	25.54	13.93	27.9	14.27	9.79	27.9	4.95	26.79
28.8	86.05	33.14	28.9	38.11	57.29	28.9	25.65	13.67	28.9	14.36	9.52	28.9	5.05	26.49
29.8	87.07	32.96	29.9	38.34	57.08	29.9	25.75	13.41	29.9	14.46	9.28	29.9	5.15	26.18
30.8	88.08	32.77	30.9	38.57	56.89	30.9	25.86	13.14	30.9	14.57	9.04	30.9	5.23	25.86
31.8	89.09	32.55	31.9	38.81	56.70	31.9	25.97	12.86	31.9	14.68	8.83	31.9	5.31	25.52
51.01	+51.00		12.29	-12.25		6.92	+6.84		6.10	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

.



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 14 13	° ' -83 17	Sept.	h m 15 2	° ' +87 33	Sept.	h m 15 24	° ' -84 11	Sept.	h m 16 54	° ' +82 10	Sept.	h m 17 16	° ' -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	30.43	53.95	1.2	72.52	13.00	1.2	6.02	62.01	1.3	20.37	45.00	1.3	7.80	29.39
2.1	30.28	53.73	2.2	72.05	12.86	2.2	5.83	61.91	2.3	20.20	45.03	2.3	7.67	29.44
3.1	30.14	53.51	3.2	71.54	12.71	3.2	5.62	61.77	3.3	20.03	45.05	3.3	7.53	29.45
4.1	30.01	53.29	4.2	71.01	12.58	4.2	5.43	61.63	4.3	19.85	45.08	4.3	7.40	29.45
5.1	29.89	53.08	5.2	70.45	12.41	5.2	5.27	61.48	5.2	19.67	45.12	5.3	7.28	29.44
6.1	29.79	52.87	6.2	69.88	12.25	6.2	5.12	61.33	6.2	19.47	45.15	6.3	7.17	29.43
7.1	29.69	52.68	7.2	69.31	12.06	7.2	4.97	61.22	7.2	19.29	45.15	7.3	7.07	29.44
8.1	29.60	52.50	8.2	68.76	11.85	8.2	4.82	61.11	8.2	19.09	45.12	8.3	6.97	29.45
9.1	29.48	52.32	9.2	68.23	11.61	9.2	4.67	61.01	9.2	18.90	45.08	9.3	6.86	29.48
10.1	29.36	52.14	10.2	67.72	11.35	10.2	4.50	60.91	10.2	18.70	45.03	10.2	6.76	29.52
11.1	29.24	51.96	11.2	67.26	11.09	11.2	4.32	60.81	11.2	18.52	44.94	11.2	6.64	29.55
12.1	29.10	51.78	12.2	66.81	10.85	12.2	4.14	60.68	12.2	18.35	44.87	12.2	6.51	29.58
13.1	28.97	51.56	13.1	66.39	10.62	13.2	3.94	60.55	13.2	18.18	44.79	13.2	6.38	29.60
14.1	28.82	51.33	14.1	65.97	10.39	14.2	3.75	60.40	14.2	18.01	44.72	14.2	6.24	29.61
15.1	28.68	51.08	15.1	65.54	10.16	15.2	3.55	60.23	15.2	17.84	44.66	15.2	6.10	29.60
16.1	28.56	50.82	16.1	65.11	9.94	16.2	3.35	60.06	16.2	17.68	44.60	16.2	5.96	29.58
17.1	28.45	50.54	17.1	64.66	9.75	17.2	3.17	59.85	17.2	17.51	44.55	17.2	5.82	29.53
18.1	28.35	50.25	18.1	64.21	9.53	18.1	3.00	59.63	18.2	17.33	44.50	18.2	5.68	29.45
19.1	28.25	49.95	19.1	63.73	9.32	19.1	2.85	59.41	19.2	17.15	44.46	19.2	5.54	29.37
20.1	28.17	49.67	20.1	63.23	9.10	20.1	2.70	59.19	20.2	16.98	44.42	20.2	5.42	29.28
21.1	28.09	49.42	21.1	62.73	8.88	21.1	2.56	58.97	21.2	16.79	44.37	21.2	5.32	29.20
22.1	28.04	49.16	22.1	62.24	8.61	22.1	2.44	58.78	22.2	16.60	44.29	22.2	5.22	29.12
23.1	27.96	48.94	23.1	61.76	8.31	23.1	2.32	58.60	23.2	16.41	44.17	23.2	5.12	29.05
24.1	27.88	48.72	24.1	61.30	8.00	24.1	2.19	58.44	24.2	16.22	44.03	24.2	5.02	29.00
25.1	27.81	48.51	25.1	60.88	7.69	25.1	2.05	58.27	25.2	16.04	43.88	25.2	4.92	28.97
26.1	27.72	48.27	26.1	60.49	7.38	26.1	1.91	58.11	26.2	15.87	43.72	26.2	4.80	28.94
27.1	27.62	48.03	27.1	60.12	7.07	27.1	1.74	57.92	27.2	15.69	43.57	27.2	4.67	28.90
28.1	27.52	47.75	28.1	59.77	6.79	28.1	1.57	57.71	28.2	15.52	43.41	28.2	4.54	28.84
29.1	27.41	47.42	29.1	59.42	6.51	29.1	1.40	57.49	29.2	15.38	43.27	29.2	4.40	28.75
30.1	27.33	47.12	30.1	59.05	6.28	30.1	1.26	57.23	30.2	15.21	43.16	30.2	4.27	28.63
31.1	27.27	46.80	31.1	58.66	6.01	31.1	1.12	56.95	31.2	15.05	43.06	31.2	4.14	28.48
32.1	27.22	46.47	32.1	58.24	5.76	32.1	1.01	56.67	32.2	14.88	42.96	32.2	4.02	28.31
8.57 -8.51			23.42 +23.40			9.90 -9.85			7.35 +7.28			6.25 -6.17		
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21''.03			+87° 33' 10''.52			-84° 11' 30''.39			+82° 10' 32''.75			-80° 47' 6''.56		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Sept.	17 58	+86 37	Sept.	18 6	-87 40	Sept.	19 1	+89 1	Sept.	19 29	-89 13	Sept.	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.3	49.56	7.31	1.3	61.45	10.06	1.3	69.78	21.02	1.4	88.60	35.77	1.4	44.12	51.37
2.3	49.19	7.41	2.3	60.94	10.18	2.3	68.65	21.20	2.4	87.38	36.01	2.4	44.04	51.68
3.3	48.82	7.53	3.3	60.42	10.28	3.3	67.52	21.42	3.4	86.11	36.20	3.4	43.95	52.00
4.3	48.42	7.67	4.3	59.94	10.35	4.3	66.36	21.64	4.4	84.83	36.39	4.4	43.88	52.33
5.3	48.01	7.80	5.3	59.46	10.40	5.3	65.12	21.88	5.4	83.61	36.54	5.4	43.79	52.69
6.3	47.59	7.94	6.3	59.02	10.46	6.3	63.82	22.13	6.4	82.46	36.70	6.4	43.70	53.06
7.3	47.13	8.06	7.3	58.60	10.52	7.3	62.43	22.37	7.3	81.38	36.85	7.4	43.61	53.42
8.3	46.68	8.16	8.3	58.19	10.60	8.3	60.99	22.56	8.3	80.36	37.01	8.4	43.50	53.77
9.3	46.23	8.22	9.3	57.78	10.69	9.3	59.52	22.73	9.3	79.33	37.19	9.4	43.39	54.10
10.3	45.78	8.27	10.3	57.36	10.79	10.3	58.05	22.88	10.3	78.29	37.38	10.4	43.26	54.39
11.3	45.35	8.30	11.3	56.90	10.90	11.3	56.62	23.01	11.3	77.16	37.59	11.4	43.13	54.67
12.3	44.93	8.35	12.3	56.40	11.01	12.3	55.22	23.11	12.3	75.97	37.80	12.4	43.01	54.95
13.3	44.51	8.38	13.3	55.90	11.12	13.3	53.87	23.23	13.3	74.68	38.01	13.4	42.88	55.22
14.3	44.12	8.40	14.3	55.36	11.21	14.3	52.56	23.35	14.3	73.30	38.21	14.4	42.78	55.48
15.3	43.73	8.43	15.3	54.81	11.26	15.3	51.28	23.48	15.3	71.85	38.38	15.4	42.66	55.74
16.3	43.34	8.47	16.3	54.24	11.30	16.3	50.01	23.61	16.3	70.35	38.53	16.4	42.55	56.01
17.3	42.93	8.50	17.3	53.68	11.32	17.3	48.76	23.76	17.3	68.80	38.66	17.4	42.44	56.27
18.3	42.53	8.56	18.3	53.13	11.33	18.3	47.48	23.92	18.3	67.25	38.78	18.4	42.32	56.55
19.3	42.12	8.62	19.3	52.60	11.33	19.3	46.15	24.09	19.3	65.73	38.90	19.4	42.22	56.83
20.3	41.69	8.69	20.3	52.09	11.31	20.3	44.78	24.26	20.3	64.27	38.99	20.4	42.09	57.15
21.2	41.24	8.76	21.3	51.61	11.29	21.3	43.32	24.41	21.3	62.89	39.06	21.4	41.97	57.46
22.2	40.78	8.79	22.3	51.17	11.27	22.3	41.79	24.55	22.3	61.58	39.14	22.4	41.84	57.76
23.2	40.31	8.80	23.2	50.74	11.27	23.3	40.21	24.68	23.3	60.33	39.24	23.4	41.70	58.05
24.2	39.85	8.77	24.2	50.31	11.29	24.3	38.59	24.78	24.3	59.12	39.35	24.4	41.55	58.32
25.2	39.37	8.74	25.2	49.87	11.30	25.3	36.98	24.84	25.3	57.89	39.47	25.4	41.40	58.56
26.2	38.93	8.68	26.2	49.37	11.34	26.3	35.42	24.90	26.3	56.58	39.61	26.4	41.24	58.80
27.2	38.50	8.64	27.2	48.87	11.36	27.3	33.93	24.94	27.3	55.17	39.75	27.4	41.09	59.00
28.2	38.09	8.58	28.2	48.32	11.37	28.3	32.51	24.98	28.3	53.62	39.89	28.3	40.94	59.21
29.2	37.71	8.53	29.2	47.76	11.34	29.3	31.14	25.04	29.3	51.99	39.99	29.3	40.80	59.40
30.2	37.30	8.51	30.2	47.19	11.29	30.3	29.80	25.12	30.3	50.30	40.05	30.3	40.67	59.64
31.2	36.90	8.51	31.2	46.63	11.22	31.3	28.46	25.23	31.3	48.60	40.11	31.3	40.54	59.88
32.2	36.49	8.52	32.2	46.11	11.13	32.3	27.06	25.34	32.3	46.95	40.13	32.3	40.42	60.14
16.96	+16.93		24.59	-24.57		58.66	+58.65		74.15	-74.15		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 21 38	° ' " -83 5	Sept.	h m 22 16	° ' " -86 23	Sept.	h m 22 37	° ' " -81 48	Sept.	h m 23 28	° ' " +86 51	Sept.	h m 23 47	° ' " -82 28
	s "			s "			s "			s "			s "	
1.5	40.33	54.55	1.5	43.00	10.03	1.5	55.14	42.02	1.5	4.04	14.66	1.5	30.14	20.81
2.5	40.29	54.87	2.5	42.97	10.36	2.5	55.14	42.35	2.5	4.12	14.99	2.5	30.20	21.12
3.5	40.23	55.17	3.5	42.91	10.68	3.5	55.14	42.66	3.5	4.22	15.35	3.5	30.23	21.42
4.4	40.16	55.44	4.5	42.82	10.97	4.5	55.12	42.95	4.5	4.33	15.71	4.5	30.26	21.72
5.4	40.10	55.70	5.5	42.73	11.25	5.5	55.10	43.23	5.5	4.43	16.09	5.5	30.29	22.01
6.4	40.05	55.94	6.5	42.67	11.52	6.5	55.08	43.48	6.5	4.53	16.51	6.5	30.32	22.28
7.4	40.00	56.17	7.5	42.61	11.76	7.5	55.07	43.75	7.5	4.62	16.91	7.5	30.35	22.55
8.4	39.96	56.41	8.5	42.57	12.03	8.5	55.08	44.01	8.5	4.66	17.33	8.5	30.39	22.80
9.4	39.93	56.68	9.5	42.54	12.30	9.5	55.08	44.28	9.5	4.67	17.74	9.5	30.44	23.06
10.4	39.89	56.95	10.5	42.52	12.59	10.5	55.09	44.56	10.5	4.68	18.14	10.5	30.48	23.33
11.4	39.85	57.23	11.5	42.49	12.89	11.5	55.09	44.86	11.5	4.65	18.53	11.5	30.53	23.61
12.4	39.80	57.54	12.5	42.44	13.21	12.5	55.08	45.17	12.5	4.62	18.91	12.5	30.58	23.91
13.4	39.75	57.85	13.4	42.39	13.53	13.5	55.07	45.49	13.5	4.59	19.28	13.5	30.61	24.22
14.4	39.67	58.17	14.4	42.30	13.86	14.5	55.05	45.82	14.5	4.56	19.63	14.5	30.64	24.55
15.4	39.58	58.48	15.4	42.20	14.19	15.5	55.01	46.15	15.5	4.55	19.99	15.5	30.65	24.88
16.4	39.49	58.77	16.4	42.07	14.52	16.5	54.97	46.48	16.5	4.54	20.32	16.5	30.67	25.24
17.4	39.39	59.06	17.4	41.92	14.82	17.5	54.92	46.80	17.5	4.55	20.67	17.5	30.67	25.58
18.4	39.28	59.32	18.4	41.75	15.12	18.5	54.87	47.10	18.5	4.56	21.03	18.5	30.66	25.92
19.4	39.17	59.57	19.4	41.59	15.39	19.4	54.81	47.39	19.5	4.57	21.42	19.5	30.64	26.24
20.4	39.06	59.81	20.4	41.42	15.67	20.4	54.75	47.67	20.5	4.59	21.82	20.5	30.63	26.54
21.4	38.96	60.01	21.4	41.27	15.91	21.4	54.70	47.93	21.5	4.59	22.23	21.5	30.61	26.83
22.4	38.87	60.22	22.4	41.13	16.15	22.4	54.65	48.17	22.5	4.56	22.65	22.5	30.59	27.11
23.4	38.80	60.44	23.4	41.01	16.40	23.4	54.61	48.41	23.5	4.52	23.08	23.5	30.59	27.38
24.4	38.72	60.67	24.4	40.91	16.64	24.4	54.59	48.67	24.5	4.44	23.50	24.5	30.60	27.64
25.4	38.65	60.91	25.4	40.80	16.90	25.4	54.56	48.94	25.5	4.33	23.91	25.5	30.61	27.92
26.4	38.56	61.17	26.4	40.70	17.18	26.4	54.52	49.22	26.5	4.20	24.31	26.5	30.63	28.22
27.4	38.47	61.43	27.4	40.56	17.49	27.4	54.48	49.53	27.5	4.08	24.67	27.5	30.63	28.53
28.4	38.37	61.69	28.4	40.40	17.78	28.4	54.43	49.83	28.5	3.97	25.03	28.5	30.62	28.86
29.4	38.24	61.95	29.4	40.21	18.07	29.4	54.35	50.15	29.5	3.87	25.37	29.5	30.58	29.21
30.4	38.10	62.19	30.4	40.00	18.35	30.4	54.27	50.44	30.5	3.80	25.71	30.5	30.54	29.54
31.4	37.96	62.42	31.4	39.75	18.60	31.4	54.18	50.72	31.4	3.74	26.06	31.5	30.49	29.87
32.4	37.82	62.62	32.4	39.51	18.83	32.4	54.09	50.97	32.4	3.69	26.44	32.5	30.43	30.19
8.32 -8.26			15.87 -15.84			7.02 -6.95			18.23 +18.20			7.63 -7.57		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

• FOR THE UPPER TRANSIT AT WASHINGTON.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensae. Mag. 6.2			5 Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 5 46	° ' " -84 49	Oct.	h m 6 46	° ' " -80 43	Oct.	h m 7 2	° ' " +87 10	Oct.	h m 7 13	° ' " +82 34	Oct.	h m 7 15	° ' " -86 53
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	5.11	24.81	0.8	52.63	21.06	0.8	32.86	32.24	0.8	54.66	7.47	0.8	53.54	53.30
1.7	5.35	24.94	1.8	52.78	21.10	1.8	33.35	32.13	1.8	54.84	7.35	1.8	53.97	53.30
2.7	5.58	25.07	2.8	52.92	21.15	2.8	33.85	32.01	2.8	55.03	7.22	2.8	54.37	53.30
3.7	5.80	25.21	3.7	53.06	21.21	3.8	34.38	31.90	3.8	55.23	7.10	3.8	54.76	53.31
4.7	6.00	25.31	4.7	53.19	21.26	4.8	34.93	31.79	4.8	55.45	6.98	4.8	55.13	53.33
5.7	6.21	25.43	5.7	53.31	21.30	5.8	35.51	31.72	5.8	55.68	6.88	5.8	55.50	53.34
6.7	6.41	25.53	6.7	53.45	21.33	6.8	36.09	31.67	6.8	55.91	6.81	6.8	55.85	53.33
7.7	6.62	25.62	7.7	53.58	21.35	7.7	36.67	31.64	7.8	56.13	6.76	7.8	56.21	53.31
8.7	6.84	25.70	8.7	53.70	21.36	8.7	37.22	31.63	8.8	56.34	6.71	8.8	56.57	53.27
9.7	7.06	25.79	9.7	53.84	21.38	9.7	37.75	31.63	9.8	56.55	6.70	9.8	56.96	53.23
10.7	7.29	25.92	10.7	53.98	21.41	10.7	38.26	31.64	10.7	56.75	6.69	10.7	57.36	53.21
11.7	7.53	26.04	11.7	54.11	21.44	11.7	38.76	31.65	11.7	56.94	6.67	11.7	57.78	53.20
12.7	7.77	26.17	12.7	54.26	21.49	12.7	39.25	31.65	12.7	57.13	6.64	12.7	58.21	53.19
13.7	8.00	26.31	13.7	54.40	21.56	13.7	39.72	31.64	13.7	57.30	6.61	13.7	58.64	53.23
14.7	8.23	26.48	14.7	54.55	21.64	14.7	40.18	31.62	14.7	57.49	6.58	14.7	59.08	53.27
15.7	8.46	26.68	15.7	54.69	21.75	15.7	40.66	31.60	15.7	57.67	6.54	15.7	59.51	53.33
16.7	8.68	26.89	16.7	54.83	21.88	16.7	41.15	31.57	16.7	57.85	6.49	16.7	59.93	53.41
17.7	8.88	27.10	17.7	54.97	22.02	17.7	41.66	31.53	17.7	58.05	6.43	17.7	60.35	53.51
18.7	9.08	27.31	18.7	55.10	22.17	18.7	42.20	31.51	18.7	58.27	6.37	18.7	60.73	53.61
19.7	9.26	27.50	19.7	55.22	22.31	19.7	42.76	31.50	19.7	58.49	6.34	19.7	61.10	53.72
20.7	9.44	27.70	20.7	55.35	22.44	20.7	43.35	31.50	20.7	58.71	6.32	20.7	61.46	53.80
21.7	9.61	27.88	21.7	55.47	22.56	21.7	43.93	31.53	21.7	58.94	6.31	21.7	61.80	53.88
22.7	9.79	28.03	22.7	55.59	22.66	22.7	44.50	31.58	22.7	59.18	6.34	22.7	62.13	53.94
23.7	9.98	28.19	23.7	55.71	22.76	23.7	45.05	31.66	23.7	59.39	6.38	23.7	62.50	53.99
24.6	10.17	28.36	24.7	55.84	22.85	24.7	45.57	31.75	24.7	59.59	6.43	24.7	62.87	54.05
25.6	10.37	28.55	25.7	55.96	22.97	25.7	46.06	31.83	25.7	59.78	6.49	25.7	63.27	54.13
26.6	10.57	28.77	26.7	56.10	23.11	26.7	46.53	31.90	26.7	59.97	6.53	26.7	63.68	54.21
27.6	10.77	29.00	27.7	56.23	23.28	27.7	46.99	31.95	27.7	60.14	6.56	27.7	64.11	54.33
28.6	10.97	29.26	28.7	56.37	23.48	28.7	47.44	31.99	28.7	60.32	6.57	28.7	64.53	54.50
29.6	11.15	29.55	29.7	56.50	23.70	29.7	47.92	32.01	29.7	60.51	6.57	29.7	64.92	54.68
30.6	11.31	29.84	30.7	56.62	23.93	30.7	48.43	32.02	30.7	60.70	6.57	30.7	65.30	54.86
31.6	11.46	30.12	31.7	56.73	24.15	31.7	48.96	32.05	31.7	60.91	6.58	31.7	65.65	55.04
11.08 -11.04			6.20 -6.12			20.29 +20.27			7.73 +7.67			18.48 -18.45		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46''.89			-80° 43' 38''.16			+87° 10' 54''.74			+82° 34' 30''.13			-86° 54' 6''.70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Oct.	8 16	+88 52	Oct.	9 8	-85 19	Oct.	9 25	+81 41	Oct.	9 36	-80 34	Oct.	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.8	28.08	32.77	0.9	38.57	56.89	0.9	25.86	13.14	0.9	14.57	9.04	0.9	5.23	25.86
1.8	29.09	32.55	1.9	38.81	56.70	1.9	25.97	12.86	1.9	14.68	8.83	1.9	5.31	25.52
2.8	30.15	32.33	2.8	39.06	56.56	2.9	26.08	12.55	2.9	14.80	8.64	2.9	5.40	25.16
3.8	31.30	32.10	3.8	39.30	56.43	3.9	26.20	12.22	3.9	14.91	8.49	3.9	5.49	24.80
4.8	32.52	31.88	4.8	39.53	56.31	4.9	26.34	11.91	4.9	15.02	8.35	4.9	5.62	24.43
5.8	33.80	31.68	5.8	39.74	56.18	5.9	26.49	11.62	5.9	15.13	8.19	5.9	5.75	24.06
6.8	35.11	31.50	6.8	39.95	56.05	6.9	26.64	11.33	6.9	15.23	8.02	6.9	5.89	23.72
7.8	36.44	31.35	7.8	40.16	55.90	7.8	26.81	11.07	7.9	15.33	7.85	7.9	6.03	23.38
8.8	37.75	31.21	8.8	40.36	55.72	8.8	26.96	10.83	8.9	15.43	7.67	8.9	6.18	23.07
9.8	39.02	31.09	9.8	40.58	55.55	9.8	27.12	10.59	9.9	15.53	7.48	9.9	6.32	22.77
10.8	40.24	30.99	10.8	40.80	55.39	10.8	27.26	10.37	10.8	15.64	7.29	10.9	6.46	22.48
11.8	41.42	30.88	11.8	41.04	55.23	11.8	27.41	10.17	11.8	15.74	7.09	11.9	6.60	22.20
12.8	42.55	30.76	12.8	41.29	55.07	12.8	27.54	9.97	12.8	15.87	6.89	12.9	6.73	21.93
13.8	43.67	30.63	13.8	41.56	54.92	13.8	27.67	9.75	13.8	15.99	6.71	13.9	6.85	21.67
14.8	44.76	30.51	14.8	41.83	54.80	14.8	27.80	9.53	14.8	16.12	6.57	14.9	6.96	21.40
15.8	45.87	30.39	15.8	42.11	54.69	15.8	27.93	9.30	15.8	16.25	6.43	15.9	7.08	21.12
16.8	47.00	30.25	16.8	42.38	54.59	16.8	28.06	9.06	16.8	16.39	6.32	16.9	7.20	20.81
17.8	48.18	30.10	17.8	42.67	54.53	17.8	28.19	8.82	17.8	16.53	6.22	17.9	7.32	20.49
18.8	49.42	29.94	18.8	42.94	54.48	18.8	28.34	8.57	18.8	16.66	6.13	18.9	7.46	20.17
19.8	50.74	29.79	19.8	43.20	54.43	19.8	28.52	8.32	19.8	16.79	6.06	19.9	7.60	19.85
20.8	52.12	29.67	20.8	43.44	54.38	20.8	28.68	8.08	20.8	16.92	5.99	20.8	7.78	19.53
21.8	53.53	29.57	21.8	43.67	54.33	21.8	28.85	7.85	21.8	17.04	5.91	21.8	7.96	19.23
22.8	54.95	29.50	22.8	43.90	54.25	22.8	29.04	7.64	22.8	17.16	5.82	22.8	8.14	18.94
23.8	56.33	29.44	23.8	44.14	54.17	23.8	29.22	7.46	23.8	17.27	5.71	23.8	8.32	18.70
24.8	57.66	29.40	24.8	44.37	54.08	24.8	29.40	7.31	24.8	17.39	5.61	24.8	8.50	18.45
25.8	58.90	29.36	25.8	44.64	53.99	25.8	29.55	7.16	25.8	17.51	5.50	25.8	8.66	18.22
26.7	60.08	29.32	26.8	44.92	53.92	26.8	29.70	7.00	26.8	17.64	5.38	26.8	8.81	18.00
27.7	61.22	29.27	27.8	45.21	53.87	27.8	29.85	6.82	27.8	17.78	5.30	27.8	8.95	17.78
28.7	62.34	29.19	28.8	45.51	53.84	28.8	29.98	6.65	28.8	17.94	5.25	28.8	9.09	17.54
29.7	63.50	29.11	29.8	45.81	53.85	29.8	30.12	6.46	29.8	18.08	5.21	29.8	9.24	17.27
30.7	64.72	29.02	30.8	46.11	53.89	30.8	30.29	6.25	30.8	18.24	5.21	30.8	9.38	16.99
31.7	66.01	28.92	31.8	46.39	53.92	31.8	30.46	6.05	31.8	18.39	5.23	31.8	9.55	16.71
50.94 +50.93			12.29 -12.25			6.91 +6.84			6.10 -6.02			8.17 +8.11		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 14 13	° ' -83 17	Oct.	h m 15 2	° ' +87 32	Oct.	h m 15 23	° ' -84 11	Oct.	h m 16 54	° ' +82 10	Oct.	h m 17 16	° ' -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	27.27	46.80	1.1	58.66	66.01	1.1	61.12	56.95	1.2	15.05	43.06	1.2	4.14	28.48
2.1	27.22	46.47	2.1	58.24	65.76	2.1	61.01	56.67	2.2	14.88	42.96	2.2	4.02	28.31
3.1	27.19	46.15	3.1	57.79	65.50	3.1	60.91	56.38	3.2	14.70	42.86	3.2	3.92	28.14
4.1	27.16	45.87	4.1	57.34	65.21	4.1	60.82	56.12	4.2	14.51	42.74	4.2	3.82	28.00
5.1	27.14	45.61	5.1	56.92	64.91	5.1	60.73	55.88	5.2	14.33	42.59	5.2	3.73	27.85
6.1	27.11	45.33	6.1	56.50	64.58	6.1	60.65	55.66	6.2	14.16	42.42	6.2	3.65	27.72
7.0	27.07	45.05	7.1	56.13	64.21	7.1	60.56	55.43	7.2	13.98	42.23	7.2	3.56	27.60
8.0	27.03	44.80	8.1	55.80	63.85	8.1	60.44	55.21	8.2	13.81	42.01	8.2	3.46	27.50
9.0	26.98	44.53	9.1	55.48	63.51	9.1	60.32	54.98	9.2	13.65	41.79	9.2	3.34	27.39
10.0	26.92	44.23	10.1	55.20	63.19	10.1	60.20	54.74	10.2	13.50	41.58	10.2	3.22	27.26
11.0	26.86	43.91	11.1	54.92	62.87	11.1	60.08	54.47	11.1	13.35	41.38	11.2	3.10	27.13
12.0	26.81	43.61	12.1	54.66	62.53	12.1	59.96	54.20	12.1	13.21	41.18	12.2	2.98	26.98
13.0	26.76	43.28	13.1	54.39	62.21	13.1	59.84	53.92	13.1	13.06	40.98	13.2	2.86	26.80
14.0	26.73	42.95	14.1	54.11	61.94	14.1	59.74	53.60	14.1	12.92	40.80	14.2	2.73	26.60
15.0	26.70	42.61	15.1	53.80	61.65	15.1	59.64	53.28	15.1	12.77	40.63	15.2	2.62	26.39
16.0	26.69	42.26	16.1	53.50	61.37	16.1	59.56	52.94	16.1	12.62	40.47	16.2	2.52	26.17
17.0	26.69	41.92	17.1	53.18	61.05	17.1	59.50	52.62	17.1	12.47	40.30	17.1	2.41	25.94
18.0	26.71	41.60	18.1	52.85	60.73	18.1	59.44	52.31	18.1	12.31	40.12	18.1	2.32	25.71
19.0	26.74	41.27	19.1	52.52	60.39	19.1	59.40	52.01	19.1	12.15	39.91	19.1	2.24	25.49
20.0	26.76	41.00	20.0	52.20	60.05	20.1	59.37	51.72	20.1	11.99	39.68	20.1	2.18	25.30
21.0	26.78	40.71	21.0	51.91	59.68	21.1	59.34	51.46	21.1	11.84	39.45	21.1	2.12	25.10
22.0	26.79	40.44	22.0	51.66	59.29	22.1	59.29	51.20	22.1	11.68	39.18	22.1	2.04	24.92
23.0	26.79	40.19	23.0	51.43	58.90	23.1	59.24	50.94	23.1	11.54	38.89	23.1	1.96	24.74
24.0	26.80	39.91	24.0	51.24	58.51	24.1	59.18	50.68	24.1	11.40	38.59	24.1	1.88	24.58
24.9	26.79	39.60	25.0	51.07	58.15	25.0	59.10	50.41	25.1	11.27	38.32	25.1	1.79	24.40
25.9	26.78	39.28	26.0	50.91	57.79	26.0	59.04	50.10	26.1	11.15	38.06	26.1	1.69	24.18
26.9	26.79	38.96	27.0	50.75	57.46	27.0	58.98	49.78	27.1	11.03	37.81	27.1	1.59	23.93
27.9	26.82	38.61	28.0	50.56	57.14	28.0	58.93	49.43	28.1	10.90	37.57	28.1	1.49	23.66
28.9	26.85	38.26	29.0	50.34	56.83	29.0	58.91	49.07	29.1	10.78	37.35	29.1	1.41	23.39
29.9	26.90	37.92	30.0	50.09	56.51	30.0	58.90	48.71	30.1	10.65	37.15	30.1	1.33	23.10
30.9	26.98	37.60	31.0	49.85	56.17	31.0	58.91	48.38	31.1	10.51	36.92	31.1	1.28	22.80
31.9	27.06	37.31	32.0	49.61	55.81	32.0	58.95	48.07	32.1	10.38	36.67	32.1	1.24	22.51
8.57      -8.51			23.40    +23.37			9.89      -9.84			7.35      +7.28			6.25      -6.17		
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21''.03			+87° 33' 10''.52			-84° 11' 30''.39			+82° 10' 32''.75			-80° 47' 6''.56		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			78 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 17 58	° ' " +86 37	Oct.	h m 18 6	° ' " -87 40	Oct.	h m 19 0	° ' " +89 1	Oct.	h m 19 29	° ' " -89 13	Oct.	h m 20 48	° ' " +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
1.2	36.90	8.51	1.2	46.63	11.22	1.3	88.46	25.23	1.3	48.60	40.11	1.3	40.54	59.88
2.2	36.49	8.52	2.2	46.11	11.13	2.3	87.06	25.34	2.3	46.95	40.13	2.3	40.42	60.14
3.2	36.04	8.52	3.2	45.64	11.03	3.3	85.59	25.45	3.3	45.38	40.14	3.3	40.28	60.41
4.2	35.58	8.50	4.2	45.20	10.94	4.3	84.04	25.56	4.3	43.91	40.14	4.3	40.14	60.67
5.2	35.12	8.47	5.2	44.75	10.84	5.3	82.43	25.63	5.3	42.50	40.14	5.3	39.99	60.93
6.2	34.67	8.42	6.2	44.31	10.76	6.3	80.80	25.69	6.3	41.15	40.18	6.3	39.83	61.16
7.2	34.20	8.32	7.2	43.88	10.69	7.2	79.17	25.73	7.3	39.79	40.23	7.3	39.66	61.36
8.2	33.77	8.22	8.2	43.42	10.63	8.2	77.57	25.73	8.3	38.38	40.27	8.3	39.49	61.55
9.2	33.33	8.11	9.2	42.95	10.58	9.2	76.01	25.72	9.3	36.91	40.32	9.3	39.32	61.74
10.2	32.92	8.01	10.2	42.44	10.50	10.2	74.51	25.72	10.3	35.36	40.36	10.3	39.15	61.90
11.2	32.53	7.90	11.2	41.92	10.42	11.2	73.07	25.70	11.3	33.75	40.41	11.3	39.00	62.05
12.2	32.15	7.79	12.2	41.38	10.34	12.2	71.68	25.69	12.3	32.06	40.42	12.3	38.84	62.20
13.2	31.76	7.69	13.2	40.83	10.24	13.2	70.31	25.70	13.3	30.33	40.43	13.3	38.68	62.34
14.2	31.39	7.60	14.2	40.30	10.10	14.2	68.95	25.71	14.2	28.56	40.41	14.3	38.53	62.49
15.2	31.01	7.53	15.2	39.77	9.95	15.2	67.59	25.71	15.2	26.81	40.38	15.3	38.39	62.67
16.2	30.62	7.45	16.2	39.26	9.78	16.2	66.20	25.74	16.2	25.08	40.35	16.3	38.24	62.85
17.2	30.21	7.38	17.2	38.79	9.60	17.2	64.78	25.77	17.2	23.41	40.27	17.3	38.10	63.02
18.2	29.80	7.30	18.2	38.35	9.41	18.2	63.29	25.80	18.2	21.83	40.19	18.3	37.94	63.20
19.2	29.37	7.20	19.2	37.94	9.23	19.2	61.73	25.81	19.2	20.35	40.09	19.3	37.77	63.38
20.2	28.94	7.07	20.2	37.56	9.08	20.2	60.13	25.81	20.2	18.94	40.03	20.3	37.60	63.57
21.2	28.50	6.94	21.2	37.18	8.93	21.2	58.50	25.77	21.2	17.60	39.96	21.3	37.42	63.72
22.2	28.06	6.77	22.2	36.81	8.79	22.2	56.84	25.73	22.2	16.28	39.91	22.3	37.24	63.86
23.2	27.65	6.59	23.2	36.42	8.66	23.2	55.24	25.67	23.2	14.91	39.87	23.3	37.05	63.97
24.2	27.26	6.39	24.2	36.00	8.53	24.2	53.73	25.58	24.2	13.46	39.84	24.3	36.87	64.06
25.2	26.88	6.20	25.2	35.54	8.38	25.2	52.29	25.47	25.2	11.92	39.81	25.3	36.69	64.12
26.2	26.53	6.02	26.2	35.07	8.21	26.2	50.92	25.38	26.2	10.28	39.77	26.3	36.52	64.18
27.1	26.19	5.87	27.2	34.59	8.01	27.2	49.61	25.32	27.2	8.58	39.69	27.3	36.37	64.27
28.1	25.85	5.73	28.2	34.13	7.78	28.2	48.31	25.28	28.2	6.87	39.57	28.3	36.22	64.38
29.1	25.48	5.60	29.1	33.70	7.54	29.2	46.97	25.24	29.2	5.22	39.43	29.3	36.06	64.50
30.1	25.11	5.47	30.1	33.31	7.28	30.2	45.58	25.21	30.2	3.66	39.28	30.3	35.91	64.63
31.1	24.73	5.33	31.1	32.96	7.03	31.2	44.11	25.18	31.2	2.19	39.10	31.3	35.73	64.77
32.1	24.34	5.20	32.1	32.63	6.78	32.2	42.60	25.14	32.2	0.85	38.92	32.3	35.56	64.87
16.95 +16.93			24.59 -24.57			58.70 +58.69			74.21 -74.20			7.40 +7.33		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			89 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 21 38	° ' " -83 6	Oct.	h m 22 16	° ' " -86 23	Oct.	h m 22 37	° ' " -81 48	Oct.	h m 23 27	° ' " +86 51	Oct.	h m 23 47	° ' " -82 28
	s "	"		s "	"		s "	"		s "	"		s "	"
1.4	37.96	2.42	1.4	39.75	18.60	1.4	54.18	50.72	1.4	63.74	26.06	1.5	30.49	29.87
2.4	37.82	2.62	2.4	39.51	18.83	2.4	54.09	50.97	2.4	63.69	26.44	2.5	30.43	30.19
3.4	37.67	2.81	3.4	39.27	19.05	3.4	54.00	51.20	3.4	63.64	26.83	3.5	30.37	30.47
4.4	37.54	2.97	4.4	39.04	19.27	4.4	53.91	51.43	4.4	63.57	27.25	4.5	30.32	30.74
5.4	37.42	3.13	5.4	38.84	19.46	5.4	53.83	51.65	5.4	63.47	27.65	5.5	30.26	31.01
6.4	37.32	3.30	6.4	38.65	19.66	6.4	53.76	51.87	6.4	63.34	28.06	6.4	30.23	31.27
7.4	37.21	3.48	7.4	38.46	19.88	7.4	53.70	52.10	7.4	63.18	28.47	7.4	30.20	31.53
8.4	37.08	3.67	8.4	38.28	20.10	8.4	53.64	52.33	8.4	63.01	28.84	8.4	30.17	31.81
9.4	36.96	3.88	9.4	38.08	20.34	9.4	53.56	52.59	9.4	62.83	29.19	9.4	30.13	32.09
10.3	36.83	4.09	10.4	37.87	20.59	10.4	53.48	52.86	10.4	62.63	29.53	10.4	30.08	32.40
11.3	36.70	4.31	11.4	37.65	20.84	11.4	53.39	53.13	11.4	62.45	29.85	11.4	30.03	32.72
12.3	36.55	4.51	12.4	37.40	21.09	12.4	53.30	53.41	12.4	62.26	30.18	12.4	29.98	33.05
13.3	36.40	4.71	13.4	37.12	21.33	13.4	53.18	53.68	13.4	62.10	30.49	13.4	29.89	33.38
14.3	36.22	4.89	14.4	36.84	21.56	14.4	53.06	53.94	14.4	61.95	30.81	14.4	29.81	33.69
15.3	36.04	5.06	15.4	36.53	21.78	15.4	52.94	54.18	15.4	61.80	31.13	15.4	29.72	34.00
16.3	35.87	5.20	16.4	36.21	21.97	16.4	52.82	54.41	16.4	61.66	31.47	16.4	29.62	34.29
17.3	35.70	5.34	17.4	35.90	22.14	17.4	52.69	54.59	17.4	61.52	31.82	17.4	29.52	34.58
18.3	35.52	5.44	18.4	35.61	22.29	18.4	52.57	54.77	18.4	61.37	32.19	18.4	29.43	34.85
19.3	35.38	5.54	19.4	35.33	22.44	19.4	52.46	54.95	19.4	61.21	32.56	19.4	29.34	35.08
20.3	35.23	5.63	20.3	35.06	22.57	20.4	52.36	55.12	20.4	61.02	32.94	20.4	29.26	35.31
21.3	35.10	5.72	21.3	34.83	22.70	21.4	52.27	55.29	21.4	60.79	33.31	21.4	29.18	35.53
22.3	34.96	5.84	22.3	34.58	22.86	22.4	52.18	55.47	22.4	60.55	33.68	22.4	29.10	35.75
23.3	34.83	5.97	23.3	34.35	23.03	23.4	52.09	55.68	23.4	60.28	34.01	23.4	29.04	35.99
24.3	34.70	6.09	24.3	34.09	23.21	24.4	51.99	55.87	24.4	60.00	34.34	24.4	28.96	36.26
25.3	34.54	6.24	25.3	33.82	23.38	25.3	51.87	56.09	25.4	59.72	34.62	25.4	28.88	36.53
26.3	34.37	6.38	26.3	33.51	23.56	26.3	51.74	56.29	26.4	59.48	34.90	26.4	28.78	36.82
27.3	34.19	6.49	27.3	33.19	23.74	27.3	51.61	56.49	27.4	59.24	35.18	27.4	28.66	37.10
28.3	33.99	6.60	28.3	32.83	23.88	28.3	51.46	56.68	28.4	59.03	35.46	28.4	28.55	37.37
29.3	33.80	6.67	29.3	32.47	23.99	29.3	51.31	56.85	29.4	58.84	35.77	29.4	28.40	37.61
30.3	33.61	6.73	30.3	32.12	24.09	30.3	51.16	56.98	30.4	58.65	36.08	30.4	28.27	37.85
31.3	33.43	6.75	31.3	31.79	24.18	31.3	51.02	57.09	31.4	58.43	36.42	31.4	28.14	38.04
32.3	33.26	6.76	32.3	31.46	24.24	32.3	50.89	57.19	32.4	58.20	36.75	32.4	28.01	38.23
8.33	-8.27		15.88	-15.85		7.02	-6.95		18.25	+18.22		7.64	-7.57	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Nov.	0 57	+85 49	Nov.	1 31	+88 52	Nov.	1 42	-85 11	Nov.	4 10	+85 20	Nov.	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.4	33.26	16.78	0.5	46.43	11.13	0.5	13.56	4.88	0.6	37.24	14.98	0.6	45.42	20.82
1.4	33.22	17.16	1.4	46.45	11.53	1.5	13.45	5.16	1.6	37.46	15.27	1.6	45.70	20.99
2.4	33.16	17.54	2.4	46.39	11.94	2.5	13.35	5.43	2.6	37.66	15.59	2.6	45.99	21.19
3.4	33.08	17.93	3.4	46.24	12.35	3.5	13.26	5.70	3.6	37.86	15.92	3.6	46.27	21.43
4.4	32.97	18.32	4.4	46.02	12.75	4.4	13.18	5.97	4.6	38.04	16.26	4.6	46.52	21.68
5.4	32.84	18.68	5.4	45.74	13.13	5.4	13.12	6.25	5.6	38.19	16.61	5.6	46.76	21.94
6.4	32.72	19.02	6.4	45.41	13.50	6.4	13.04	6.54	6.5	38.33	16.95	6.6	46.99	22.21
7.4	32.58	19.35	7.4	45.07	13.84	7.4	12.95	6.86	7.5	38.46	17.28	7.6	47.20	22.47
8.4	32.45	19.67	8.4	44.73	14.19	8.4	12.86	7.16	8.5	38.56	17.60	8.6	47.40	22.72
9.4	32.32	19.96	9.4	44.39	14.51	9.4	12.76	7.48	9.5	38.69	17.91	9.6	47.59	22.96
10.4	32.19	20.25	10.4	44.10	14.84	10.4	12.63	7.81	10.5	38.81	18.20	10.6	47.78	23.19
11.4	32.09	20.55	11.4	43.84	15.15	11.4	12.51	8.13	11.5	38.93	18.48	11.6	47.97	23.39
12.4	31.99	20.86	12.4	43.60	15.46	12.4	12.36	8.46	12.5	39.05	18.76	12.6	48.17	23.60
13.4	31.89	21.17	13.4	43.39	15.79	13.4	12.18	8.76	13.5	39.20	19.04	13.6	48.40	23.81
14.4	31.79	21.49	14.4	43.19	16.13	14.4	12.02	9.05	14.5	39.35	19.35	14.6	48.62	24.02
15.4	31.70	21.82	15.4	42.96	16.49	15.4	11.85	9.32	15.5	39.50	19.66	15.6	48.85	24.24
16.4	31.58	22.17	16.4	42.67	16.86	16.4	11.69	9.56	16.5	39.66	20.01	16.6	49.09	24.47
17.4	31.44	22.52	17.4	42.32	17.24	17.4	11.54	9.79	17.5	39.81	20.36	17.6	49.33	24.74
18.4	31.27	22.87	18.4	41.89	17.62	18.4	11.39	10.02	18.5	39.94	20.73	18.6	49.56	25.05
19.4	31.10	23.22	19.4	41.36	18.00	19.4	11.25	10.24	19.5	40.04	21.11	19.6	49.76	25.37
20.4	30.91	23.54	20.4	40.78	18.34	20.4	11.12	10.46	20.5	40.13	21.47	20.6	49.95	25.68
21.4	30.71	23.83	21.4	40.17	18.68	21.4	10.98	10.71	21.5	40.19	21.82	21.6	50.11	25.98
22.4	30.50	24.10	22.4	39.57	18.99	22.4	10.84	10.98	22.5	40.24	22.16	22.6	50.26	26.27
23.4	30.32	24.34	23.4	39.02	19.27	23.4	10.66	11.27	23.5	40.30	22.49	23.6	50.40	26.56
24.4	30.15	24.59	24.4	38.53	19.54	24.4	10.48	11.55	24.5	40.35	22.80	24.6	50.54	26.80
25.4	30.00	24.83	25.4	38.09	19.82	25.4	10.26	11.81	25.5	40.43	23.09	25.6	50.69	27.03
26.4	29.86	25.11	26.4	37.68	20.11	26.4	10.04	12.06	26.5	40.52	23.39	26.6	50.87	27.26
27.4	29.73	25.33	27.4	37.28	20.42	27.4	9.82	12.29	27.5	40.62	23.69	27.5	51.05	27.50
28.4	29.58	25.66	28.4	36.85	20.74	28.4	9.60	12.49	28.5	40.72	24.01	28.5	51.23	27.78
29.3	29.41	25.97	29.4	36.35	21.07	29.4	9.39	12.68	29.5	40.82	24.35	29.5	51.42	28.06
30.3	29.23	26.27	30.4	35.78	21.42	30.4	9.19	12.85	30.5	40.89	24.68	30.5	51.61	28.38
31.3	29.01	26.56	31.4	35.11	21.75	31.4	8.99	13.03	31.5	40.95	25.06	31.5	51.77	28.70
13.73 +13.69			50.76 +50.75			11.92 -11.87			12.31 +12.26			11.84 +11.80		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 5 46	° ' -84 49	Nov.	h m 6 46	° ' -80 43	Nov.	h m 7 2	° ' +87 10	Nov.	h m 7 14	° ' +82 34	Nov.	h m 7 16	° ' -86 53
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	11.46	30.12	0.7	56.73	24.15	0.7	48.96	32.05	0.7	0.91	6.58	0.7	5.65	55.04
1.6	11.60	30.40	1.7	56.84	24.37	1.7	49.51	32.10	1.7	1.13	6.61	1.7	5.98	55.22
2.6	11.74	30.66	2.7	56.95	24.58	2.7	50.07	32.18	2.7	1.36	6.65	2.7	6.30	55.40
3.6	11.88	30.90	3.7	57.06	24.76	3.7	50.62	32.29	3.7	1.58	6.72	3.7	6.62	55.55
4.6	12.03	31.13	4.7	57.16	24.95	4.7	51.16	32.41	4.7	1.79	6.82	4.7	6.94	55.69
5.6	12.17	31.37	5.7	57.27	25.12	5.7	51.67	32.54	5.7	1.99	6.93	5.7	7.27	55.83
6.6	12.33	31.61	6.7	57.38	25.30	6.7	52.15	32.68	6.7	2.18	7.04	6.7	7.62	55.99
7.6	12.48	31.86	7.7	57.49	25.50	7.7	52.61	32.81	7.7	2.36	7.14	7.7	7.98	56.15
8.6	12.64	32.12	8.7	57.61	25.71	8.7	53.05	32.94	8.7	2.54	7.24	8.7	8.34	56.32
9.6	12.80	32.40	9.6	57.73	25.93	9.7	53.48	33.07	9.7	2.71	7.35	9.7	8.71	56.49
10.6	12.95	32.71	10.6	57.85	26.19	10.7	53.89	33.20	10.7	2.88	7.46	10.7	9.08	56.69
11.6	13.09	33.03	11.6	57.96	26.46	11.7	54.31	33.31	11.7	3.05	7.55	11.7	9.45	56.90
12.6	13.23	33.37	12.6	58.07	26.73	12.6	54.74	33.41	12.7	3.21	7.63	12.7	9.80	57.14
13.6	13.36	33.71	13.6	58.18	27.03	13.6	55.19	33.51	13.7	3.39	7.70	13.7	10.14	57.39
14.6	13.46	34.04	14.6	58.28	27.33	14.6	55.65	33.62	14.7	3.57	7.77	14.7	10.46	57.65
15.6	13.56	34.38	15.6	58.37	27.63	15.6	56.14	33.74	15.6	3.76	7.86	15.7	10.75	57.91
16.6	13.64	34.71	16.6	58.46	27.93	16.6	56.65	33.86	16.6	3.97	7.96	16.6	11.01	58.16
17.6	13.73	35.01	17.6	58.54	28.22	17.6	57.16	34.02	17.6	4.17	8.09	17.6	11.26	58.41
18.6	13.81	35.30	18.6	58.62	28.47	18.6	57.66	34.19	18.6	4.38	8.25	18.6	11.51	58.64
19.6	13.89	35.57	19.6	58.70	28.72	19.6	58.14	34.38	19.6	4.58	8.43	19.6	11.76	58.86
20.6	13.98	35.85	20.6	58.79	28.97	20.6	58.59	34.58	20.6	4.76	8.61	20.6	12.03	59.06
21.6	14.08	36.13	21.6	58.87	29.23	21.6	59.01	34.80	21.6	4.93	8.80	21.6	12.31	59.27
22.6	14.18	36.44	22.6	58.97	29.49	22.6	59.38	35.01	22.6	5.08	8.98	22.6	12.61	59.50
23.6	14.28	36.76	23.6	59.06	29.78	23.6	59.74	35.21	23.6	5.23	9.14	23.6	12.91	59.77
24.6	14.37	37.12	24.6	59.14	30.10	24.6	60.11	35.40	24.6	5.37	9.29	24.6	13.21	60.05
25.6	14.45	37.49	25.6	59.22	30.46	25.6	60.47	35.55	25.6	5.52	9.42	25.6	13.50	60.36
26.6	14.51	37.88	26.6	59.30	30.82	26.6	60.86	35.70	26.6	5.68	9.54	26.6	13.76	60.69
27.6	14.56	38.26	27.6	59.37	31.17	27.6	61.27	35.86	27.6	5.85	9.66	27.6	14.00	61.03
28.6	14.59	38.64	28.6	59.43	31.52	28.6	61.70	36.02	28.6	6.03	9.81	28.6	14.20	61.35
29.6	14.62	38.99	29.6	59.49	31.86	29.6	62.14	36.20	29.6	6.21	9.98	29.6	14.39	61.67
30.5	14.65	39.32	30.6	59.55	32.19	30.6	62.58	36.42	30.6	6.39	10.16	30.6	14.57	61.97
31.5	14.67	39.63	31.6	59.60	32.49	31.6	63.01	36.64	31.6	6.57	10.37	31.6	14.75	62.26
11.09 -11.04			6.20 -6.12			20.30 +20.27			7.73 +7.67			18.49 -18.46		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			♄ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 8 17	° ' " +88 52	Nov.	h m 9 8	° ' " -85 19	Nov.	h m 9 25	° ' " +81 41	Nov.	h m 9 36	° ' " -80 34	Nov.	h m 10 21	° ' " +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	6.01	28.92	0.8	46.39	53.92	0.8	30.46	6.05	0.8	18.39	5.23	0.8	9.55	16.71
1.7	7.37	28.86	1.8	46.67	53.97	1.8	30.63	5.85	1.8	18.52	5.25	1.8	9.72	16.44
2.7	8.76	28.80	2.8	46.92	54.01	2.8	30.81	5.66	2.8	18.66	5.25	2.8	9.92	16.19
3.7	10.17	28.77	3.8	47.17	54.02	3.8	31.01	5.51	3.8	18.79	5.24	3.8	10.11	15.95
4.7	11.56	28.78	4.8	47.41	54.03	4.8	31.20	5.37	4.8	18.92	5.22	4.8	10.32	15.72
5.7	12.91	28.79	5.8	47.66	54.03	5.8	31.38	5.25	5.8	19.04	5.19	5.8	10.51	15.51
6.7	14.20	28.81	6.8	47.93	54.04	6.8	31.56	5.15	6.8	19.18	5.17	6.8	10.70	15.34
7.7	15.44	28.84	7.8	48.19	54.04	7.8	31.73	5.06	7.8	19.32	5.14	7.8	10.89	15.16
8.7	16.64	28.87	8.7	48.47	54.05	8.8	31.89	4.98	8.8	19.45	5.12	8.8	11.06	14.98
9.7	17.80	28.88	9.7	48.75	54.07	9.8	32.04	4.89	9.8	19.59	5.11	9.8	11.23	14.82
10.7	18.92	28.89	10.7	49.05	54.12	10.8	32.19	4.81	10.8	19.74	5.13	10.8	11.40	14.66
11.7	20.04	28.91	11.7	49.35	54.17	11.8	32.34	4.71	11.8	19.90	5.16	11.8	11.56	14.49
12.7	21.17	28.91	12.7	49.64	54.25	12.8	32.50	4.60	12.8	20.05	5.20	12.8	11.72	14.30
13.7	22.32	28.90	13.7	49.94	54.36	13.7	32.66	4.48	13.8	20.20	5.26	13.8	11.88	14.11
14.7	23.55	28.90	14.7	50.23	54.48	14.7	32.83	4.35	14.8	20.35	5.35	14.8	12.06	13.91
15.7	24.83	28.91	15.7	50.50	54.61	15.7	33.00	4.22	15.7	20.51	5.45	15.8	12.24	13.72
16.7	26.16	28.93	16.7	50.76	54.75	16.7	33.19	4.12	16.7	20.65	5.56	16.8	12.44	13.51
17.7	27.52	28.97	17.7	51.00	54.87	17.7	33.39	4.02	17.7	20.79	5.64	17.8	12.66	13.32
18.7	28.90	29.02	18.7	51.24	54.97	18.7	33.58	3.95	18.7	20.92	5.75	18.8	12.88	13.18
19.7	30.25	29.10	19.7	51.48	55.08	19.7	33.79	3.90	19.7	21.04	5.84	19.8	13.10	13.03
20.7	31.54	29.19	20.7	51.71	55.16	20.7	33.97	3.86	20.7	21.16	5.90	20.8	13.33	12.92
21.7	32.75	29.30	21.7	51.96	55.25	21.7	34.16	3.86	21.7	21.29	5.96	21.8	13.52	12.82
22.7	33.88	29.42	22.7	52.23	55.37	22.7	34.33	3.85	22.7	21.43	6.03	22.8	13.71	12.73
23.7	34.95	29.52	23.7	52.51	55.50	23.7	34.47	3.83	23.7	21.57	6.11	23.8	13.89	12.64
24.7	35.97	29.62	24.7	52.79	55.64	24.7	34.62	3.80	24.7	21.72	6.22	24.8	14.07	12.53
25.7	37.02	29.68	25.7	53.08	55.80	25.7	34.77	3.76	25.7	21.87	6.35	25.8	14.23	12.43
26.7	38.10	29.73	26.7	53.36	55.99	26.7	34.93	3.70	26.7	22.03	6.54	26.7	14.40	12.30
27.7	39.24	29.77	27.7	53.63	56.22	27.7	35.10	3.63	27.7	22.18	6.72	27.7	14.58	12.16
28.7	40.44	29.84	28.7	53.88	56.45	28.7	35.28	3.56	28.7	22.32	6.92	28.7	14.78	12.04
29.7	41.69	29.93	29.7	54.12	56.64	29.7	35.46	3.52	29.7	22.46	7.11	29.7	15.00	11.90
30.7	42.95	30.02	30.7	54.34	56.84	30.7	35.65	3.50	30.7	22.58	7.29	30.7	15.22	11.80
31.7	44.21	30.16	31.7	54.55	57.04	31.7	35.85	3.49	31.7	22.71	7.48	31.7	15.45	11.71
50.92 +50.91			12.29 -12.25			6.91 +6.84			6.10 -6.02			8.17 +8.11		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 10 59	° ' -84 8	Nov.	h m 12 13	° ' +88 8	Nov.	h m 12 46	° ' -84 40	Nov.	h m 12 48	° ' +83 51	Nov.	h m 13 27	° ' -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.8	47.26	55.87	0.9	58.63	61.53	0.9	1.27	34.88	0.9	20.82	19.17	0.9	9.34	56.97
1.8	47.46	55.76	1.9	58.94	61.15	1.9	1.43	34.65	1.9	20.88	18.76	1.9	9.49	56.72
2.8	47.66	55.66	2.9	59.30	60.76	2.9	1.58	34.44	2.9	20.97	18.35	2.9	9.62	56.47
3.8	47.85	55.56	3.9	59.70	60.39	3.9	1.72	34.23	3.9	21.07	17.96	3.9	9.75	56.22
4.8	48.03	55.43	4.9	60.15	60.04	4.9	1.85	34.02	4.9	21.17	17.58	4.9	9.86	55.98
5.8	48.20	55.30	5.9	60.60	59.71	5.9	1.98	33.79	5.9	21.28	17.21	5.9	9.96	55.71
6.8	48.38	55.17	6.9	61.07	59.41	6.9	2.11	33.54	6.9	21.39	16.86	6.9	10.07	55.44
7.8	48.57	55.04	7.9	61.50	59.11	7.9	2.25	33.28	7.9	21.50	16.52	7.9	10.20	55.15
8.8	48.76	54.89	8.9	61.92	58.82	8.9	2.39	33.01	8.9	21.60	16.20	8.9	10.32	54.86
9.8	48.98	54.75	9.9	62.34	58.54	9.9	2.56	32.75	9.9	21.70	15.90	9.9	10.46	54.56
10.8	49.20	54.64	10.9	62.73	58.26	10.9	2.73	32.50	10.9	21.79	15.60	10.9	10.62	54.27
11.8	49.43	54.54	11.9	63.10	57.98	11.9	2.92	32.25	11.9	21.89	15.29	11.9	10.80	53.98
12.8	49.66	54.43	12.9	63.45	57.68	12.9	3.12	32.01	12.9	21.98	14.97	12.9	10.98	53.70
13.8	49.90	54.37	13.9	63.82	57.39	13.9	3.33	31.79	13.9	22.06	14.64	13.9	11.18	53.43
14.8	50.14	54.32	14.9	64.19	57.08	14.9	3.56	31.59	14.9	22.15	14.30	14.9	11.41	53.19
15.8	50.38	54.28	15.9	64.61	56.76	15.9	3.77	31.40	15.9	22.26	13.94	15.9	11.61	52.96
16.8	50.61	54.27	16.9	65.07	56.43	16.9	3.98	31.25	16.9	22.38	13.56	16.9	11.82	52.77
17.8	50.81	54.27	17.9	65.58	56.10	17.9	4.17	31.10	17.9	22.51	13.19	17.9	12.03	52.58
18.8	51.01	54.25	18.8	66.14	55.78	18.9	4.36	30.96	18.9	22.66	12.84	18.9	12.21	52.39
19.8	51.21	54.21	19.8	66.73	55.49	19.9	4.55	30.80	19.9	22.82	12.51	19.9	12.39	52.19
20.8	51.41	54.16	20.8	67.33	55.21	20.9	4.72	30.62	20.9	22.98	12.20	20.9	12.56	51.97
21.8	51.60	54.12	21.8	67.91	54.97	21.9	4.90	30.43	21.9	23.13	11.91	21.9	12.73	51.74
22.8	51.83	54.07	22.8	68.46	54.74	22.9	5.09	30.25	22.9	23.28	11.63	22.9	12.91	51.51
23.8	52.06	54.02	23.8	68.97	54.52	23.9	5.30	30.06	23.9	23.42	11.37	23.9	13.13	51.27
24.8	52.30	53.98	24.8	69.44	54.31	24.9	5.53	29.88	24.9	23.53	11.11	24.9	13.36	51.03
25.8	52.55	53.98	25.8	69.89	54.07	25.9	5.77	29.70	25.9	23.64	10.84	25.9	13.60	50.79
26.8	52.82	54.02	26.8	70.34	53.83	26.8	6.04	29.56	26.9	23.77	10.55	26.9	13.87	50.59
27.8	53.07	54.06	27.8	70.80	53.56	27.8	6.30	29.43	27.8	23.90	10.25	27.9	14.14	50.41
28.8	53.32	54.12	28.8	71.31	53.30	28.8	6.55	29.33	28.8	24.03	9.94	28.9	14.42	50.26
29.8	53.55	54.20	29.8	71.87	53.04	29.8	6.80	29.25	29.8	24.20	9.62	29.9	14.68	50.12
30.8	53.77	54.27	30.8	72.48	52.77	30.8	7.04	29.18	30.8	24.37	9.31	30.9	14.92	49.99
31.8	53.97	54.33	31.8	73.13	52.53	31.8	7.25	29.10	31.8	24.55	9.02	31.9	15.16	49.86
9.81    -9.76			30.96   +30.94			10.78   -10.73			9.34    +9.29			12.37   -12.33		
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Nov.	14 13	−83 17	Nov.	15 2	+87 32	Nov.	15 23	−84 11	Nov.	16 54	+82 10	Nov.	17 16	−80 47
	s	"		s	"		s	"		s	"		s	"
0.9	27.06	37.31	1.0	49.61	55.81	1.0	58.95	48.07	1.1	10.38	36.67	1.1	1.24	22.51
1.9	27.14	37.02	2.0	49.40	55.44	2.0	58.96	47.79	2.1	10.24	36.39	2.1	1.20	22.26
2.9	27.20	36.76	3.0	49.21	55.02	3.0	58.97	47.51	3.1	10.11	36.09	3.1	1.16	22.02
3.9	27.25	36.49	4.0	49.07	54.61	4.0	58.98	47.23	4.1	9.98	35.78	4.1	1.11	21.79
4.9	27.30	36.22	5.0	48.96	54.23	5.0	58.98	46.95	5.1	9.89	35.45	5.1	1.06	21.56
5.9	27.35	35.95	6.0	48.87	53.85	6.0	58.97	46.67	6.1	9.77	35.12	6.1	0.99	21.33
6.9	27.39	35.67	6.9	48.81	53.47	7.0	58.96	46.35	7.1	9.67	34.80	7.1	0.92	21.09
7.9	27.43	35.36	7.9	48.76	53.09	8.0	58.95	46.03	8.1	9.58	34.50	8.1	0.84	20.83
8.9	27.49	35.05	8.9	48.70	52.74	9.0	58.94	45.71	9.1	9.49	34.20	9.1	0.78	20.56
9.9	27.55	34.73	9.9	48.64	52.40	10.0	58.93	45.35	10.1	9.40	33.90	10.1	0.72	20.27
10.9	27.63	34.41	10.9	48.57	52.07	11.0	58.96	45.01	11.1	9.31	33.62	11.1	0.65	19.96
11.9	27.71	34.10	11.9	48.49	51.75	11.9	58.98	44.66	12.1	9.21	33.35	12.1	0.60	19.63
12.9	27.81	33.79	12.9	48.40	51.42	12.9	59.02	44.32	13.1	9.11	33.10	13.1	0.55	19.30
13.9	27.91	33.49	13.9	48.30	51.06	13.9	59.07	43.98	14.1	9.02	32.82	14.1	0.53	18.99
14.9	28.04	33.21	14.9	48.20	50.71	14.9	59.16	43.66	15.1	8.92	32.52	15.1	0.51	18.67
15.9	28.16	32.96	15.9	48.10	50.34	15.9	59.24	43.34	16.1	8.81	32.21	16.1	0.50	18.36
16.9	28.30	32.72	16.9	48.02	49.93	16.9	59.32	43.06	17.0	8.72	31.85	17.1	0.49	18.07
17.9	28.40	32.49	17.9	47.98	49.53	17.9	59.40	42.78	18.0	8.63	31.49	18.1	0.49	17.80
18.9	28.51	32.27	18.9	47.97	49.12	18.9	59.48	42.52	19.0	8.54	31.12	19.1	0.49	17.54
19.9	28.61	32.04	19.9	48.01	48.71	19.9	59.53	42.26	20.0	8.47	30.75	20.1	0.47	17.27
20.9	28.70	31.80	20.9	48.07	48.33	20.9	59.58	42.00	21.0	8.41	30.37	21.1	0.44	17.02
21.9	28.79	31.53	21.9	48.15	47.95	21.9	59.62	41.71	22.0	8.36	30.02	22.0	0.40	16.76
22.9	28.89	31.26	22.9	48.22	47.61	22.9	59.67	41.40	23.0	8.30	29.69	23.0	0.37	16.46
23.9	29.00	30.97	23.9	48.28	47.28	23.9	59.74	41.07	24.0	8.24	29.37	24.0	0.34	16.13
24.9	29.13	30.69	24.9	48.32	46.96	24.9	59.82	40.72	25.0	8.19	29.10	25.0	0.32	15.77
25.9	29.27	30.41	25.9	48.33	46.64	25.9	59.92	40.39	26.0	8.13	28.82	26.0	0.31	15.42
26.9	29.44	30.16	26.9	48.33	46.32	26.9	60.05	40.07	27.0	8.07	28.52	27.0	0.32	15.06
27.9	29.62	29.92	27.9	48.33	45.96	27.9	60.19	39.76	28.0	8.00	28.21	28.0	0.35	14.73
28.9	29.79	29.72	28.9	48.36	45.60	28.9	60.33	39.48	29.0	7.93	27.88	29.0	0.37	14.42
29.9	29.95	29.53	29.9	48.40	45.23	29.9	60.47	39.22	30.0	7.87	27.51	30.0	0.40	14.11
30.9	30.10	29.35	30.9	48.48	44.85	30.9	60.60	38.97	31.0	7.82	27.13	31.0	0.43	13.82
31.9	30.25	29.18	31.9	48.61	44.47	31.9	60.72	38.73	32.0	7.77	26.76	32.0	0.45	13.55
8.56 −8.50			23.37 +23.35			9.89 −9.84			7.35 +7.28			6.25 −6.17		
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
−83° 17' 21".03			+87° 33' 10".52			−84° 11' 30".39			+82° 10' 32".75			−80° 47' 6".56		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 17 58	° ' +86 36	Nov.	h m 18 6	° ' -87 39	Nov.	h m 19 0	° ' +89 1	Nov.	h m 19 28	° ' -89 13	Nov.	h m 20 48	° ' +82 14
	s	"		s	"		s	"		s	"		s	"
1.1	24.34	65.20	1.1	32.63	66.78	1.2	42.60	25.14	1.2	60.85	38.92	1.3	35.56	4.87
2.1	23.93	65.02	2.1	32.34	66.53	2.2	41.06	25.06	2.2	59.57	38.77	2.3	35.39	4.98
3.1	23.54	64.80	3.1	32.05	66.32	3.2	39.50	24.96	3.2	58.31	38.64	3.2	35.21	5.07
4.1	23.15	64.57	4.1	31.74	66.12	4.2	37.98	24.83	4.2	57.06	38.53	4.2	35.02	5.13
5.1	22.78	64.34	5.1	31.42	65.91	5.2	36.52	24.69	5.2	55.76	38.41	5.2	34.84	5.18
6.1	22.45	64.10	6.1	31.07	65.71	6.2	35.11	24.55	6.2	54.42	38.28	6.2	34.65	5.19
7.1	22.13	63.86	7.1	30.71	65.48	7.2	33.77	24.40	7.2	52.98	38.15	7.2	34.47	5.20
8.1	21.82	63.62	8.1	30.33	65.26	8.2	32.49	24.25	8.2	51.51	38.02	8.2	34.30	5.18
9.1	21.52	63.38	9.1	29.95	65.02	9.2	31.25	24.11	9.2	50.00	37.85	9.2	34.13	5.18
10.1	21.23	63.17	10.1	29.57	64.75	10.2	30.05	23.96	10.2	48.47	37.68	10.2	33.98	5.21
11.1	20.94	62.98	11.1	29.21	64.47	11.2	28.86	23.83	11.2	46.96	37.49	11.2	33.82	5.24
12.1	20.65	62.78	12.1	28.87	64.16	12.1	27.66	23.73	12.2	45.47	37.27	12.2	33.66	5.25
13.1	20.34	62.58	13.1	28.58	63.85	13.1	26.43	23.63	13.2	44.06	37.04	13.2	33.50	5.27
14.1	20.03	62.38	14.1	28.29	63.55	14.1	25.16	23.50	14.2	42.73	36.81	14.2	33.34	5.31
15.1	19.71	62.17	15.1	28.06	63.23	15.1	23.83	23.37	15.2	41.52	36.57	15.2	33.17	5.36
16.1	19.38	61.93	16.1	27.87	62.94	16.1	22.46	23.26	16.2	40.42	36.34	16.2	33.00	5.39
17.1	19.04	61.68	17.1	27.70	62.64	17.1	21.06	23.10	17.2	39.41	36.11	17.2	32.82	5.40
18.1	18.71	61.40	18.1	27.54	62.38	18.1	19.65	22.92	18.2	38.44	35.92	18.2	32.64	5.39
19.1	18.40	61.11	19.1	27.36	62.13	19.1	18.28	22.71	19.1	37.46	35.71	19.2	32.46	5.35
20.1	18.11	60.80	20.1	27.17	61.89	20.1	16.99	22.49	20.1	36.44	35.51	20.2	32.27	5.30
21.1	17.85	60.48	21.1	26.94	61.65	21.1	15.78	22.27	21.1	35.33	35.33	21.2	32.09	5.21
22.1	17.61	60.20	22.1	26.68	61.37	22.1	14.66	22.05	22.1	34.13	35.13	22.2	31.92	5.12
23.1	17.38	59.91	23.1	26.43	61.07	23.1	13.62	21.85	23.1	32.88	34.90	23.2	31.77	5.06
24.1	17.16	59.65	24.1	26.17	60.75	24.1	12.62	21.65	24.1	31.60	34.64	24.2	31.61	4.99
25.1	16.94	59.42	25.1	25.96	60.41	25.1	11.61	21.47	25.1	30.37	34.36	25.2	31.47	4.93
26.1	16.72	59.18	26.1	25.78	60.05	26.1	10.56	21.30	26.1	29.23	34.07	26.2	31.32	4.89
27.1	16.46	58.95	27.1	25.66	59.68	27.1	9.46	21.13	27.1	28.21	33.75	27.2	31.18	4.85
28.1	16.19	58.70	28.1	25.56	59.34	28.1	8.30	20.97	28.1	27.33	33.44	28.2	31.02	4.81
29.1	15.93	58.43	29.1	25.51	58.99	29.1	7.11	20.78	29.1	26.54	33.14	29.2	30.85	4.77
30.1	15.68	58.14	30.1	25.45	58.70	30.1	5.90	20.56	30.1	25.82	32.86	30.2	30.68	4.70
31.1	15.43	57.83	31.1	25.40	58.40	31.1	4.72	20.32	31.1	25.13	32.59	31.2	30.51	4.61
32.1	15.20	57.50	32.1	25.34	58.10	32.1	3.59	20.06	32.1	24.41	32.33	32.2	30.33	4.51
16.95 +16.92			24.57 -24.55			58.66 +58.65			74.11 -74.10			7.40 +7.33		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '
	s	"		s	"		s	"		s	"		s	"
1.3	33.26	6.76	1.3	31.46	24.24	1.3	50.89	57.19	1.4	58.20	36.75	1.4	28.01	38.23
2.3	33.11	6.77	2.3	31.16	24.31	2.3	50.77	57.28	2.4	57.94	37.09	2.4	27.92	38.41
3.3	32.97	6.81	3.3	30.88	24.38	3.3	50.64	57.37	3.4	57.66	37.41	3.4	27.81	38.60
4.3	32.82	6.86	4.3	30.60	24.48	4.3	50.53	57.50	4.4	57.35	37.70	4.4	27.71	38.78
5.3	32.67	6.91	5.3	30.31	24.58	5.3	50.41	57.62	5.4	57.02	37.99	5.4	27.60	38.97
6.3	32.50	6.96	6.3	30.00	24.68	6.3	50.30	57.74	6.4	56.69	38.26	6.4	27.49	39.18
7.3	32.34	7.02	7.3	29.69	24.77	7.3	50.17	57.88	7.3	56.37	38.49	7.4	27.38	39.39
8.3	32.16	7.08	8.3	29.37	24.87	8.3	50.03	58.02	8.3	56.05	38.73	8.4	27.25	39.61
9.3	31.98	7.13	9.3	29.03	24.97	9.3	49.88	58.15	9.3	55.74	38.96	9.4	27.11	39.83
10.3	31.79	7.15	10.3	28.66	25.07	10.3	49.73	58.28	10.3	55.45	39.19	10.4	26.97	40.05
11.3	31.59	7.16	11.3	28.29	25.14	11.3	49.56	58.38	11.3	55.17	39.42	11.4	26.82	40.26
12.3	31.40	7.16	12.3	27.90	25.18	12.3	49.40	58.47	12.3	54.90	39.66	12.3	26.65	40.46
13.3	31.21	7.13	13.3	27.52	25.21	13.3	49.24	58.55	13.3	54.63	39.90	13.3	26.49	40.64
14.3	31.01	7.09	14.3	27.16	25.22	14.3	49.08	58.60	14.3	54.36	40.16	14.3	26.34	40.78
15.3	30.83	7.04	15.3	26.80	25.21	15.3	48.93	58.63	15.3	54.08	40.40	15.3	26.19	40.92
16.2	30.68	6.96	16.3	26.47	25.17	16.3	48.80	58.63	16.3	53.77	40.63	16.3	26.04	41.04
17.2	30.53	6.89	17.3	26.15	25.14	17.3	48.67	58.64	17.3	53.43	40.95	17.3	25.91	41.14
18.2	30.38	6.83	18.3	25.86	25.12	18.3	48.54	58.67	18.3	53.07	41.22	18.3	25.77	41.24
19.2	30.24	6.78	19.3	25.57	25.12	19.3	48.42	58.70	19.3	52.69	41.45	19.3	25.65	41.35
20.2	30.10	6.74	20.3	25.27	25.12	20.3	48.30	58.74	20.3	52.28	41.65	20.3	25.52	41.47
21.2	29.94	6.71	21.3	24.96	25.13	21.3	48.17	58.78	21.3	51.90	41.85	21.3	25.39	41.61
22.2	29.77	6.68	22.3	24.64	25.14	22.3	48.03	58.84	22.3	51.52	42.02	22.3	25.25	41.74
23.2	29.59	6.64	23.3	24.28	25.15	23.3	47.86	58.90	23.3	51.18	42.18	23.3	25.09	41.88
24.2	29.39	6.58	24.3	23.90	25.15	24.3	47.70	58.94	24.3	50.85	42.35	24.3	24.92	42.02
25.2	29.20	6.50	25.2	23.51	25.11	25.3	47.53	58.94	25.3	50.53	42.50	25.3	24.74	42.15
26.2	29.01	6.38	26.2	23.13	25.05	26.3	47.36	58.92	26.3	50.24	42.66	26.3	24.57	42.25
27.2	28.83	6.24	27.2	22.75	24.96	27.3	47.20	58.88	27.3	49.93	42.86	27.3	24.39	42.33
28.2	28.66	6.07	28.2	22.40	24.86	28.3	47.05	58.82	28.3	49.61	43.06	28.3	24.23	42.39
29.2	28.52	5.92	29.2	22.08	24.75	29.3	46.92	58.76	29.3	49.25	43.26	29.3	24.06	42.42
30.2	28.38	5.78	30.2	21.77	24.65	30.3	46.78	58.68	30.3	48.88	43.47	30.3	23.92	42.44
31.2	28.24	5.65	31.2	21.49	24.54	31.2	46.66	58.62	31.3	48.47	43.65	31.3	23.78	42.47
32.2	28.11	5.55	32.2	21.20	24.46	32.2	46.53	58.58	32.3	48.06	43.78	32.3	23.64	42.50
8.33      -8.27			15.88    -15.85			7.02      -6.95			18.26    +18.24			7.64      -7.57		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 0 57	° ' +85 49	Dec.	h m 1 31	° ' +88 52	Dec.	h m 1 42	° ' -85 11	Dec.	h m 4 10	° ' +85 20	Dec.	h m 5 35	° ' +85 9
	s	"		s	"		s	"		s	"		s	"
0.3	29.23	26.27	0.4	35.78	21.42	0.4	9.19	12.85	0.5	40.89	24.68	0.5	51.61	28.38
1.3	29.01	26.56	1.4	35.11	21.75	1.4	8.99	13.03	1.5	40.95	25.06	1.5	51.77	28.70
2.3	28.79	26.83	2.4	34.39	22.05	2.4	8.80	13.21	2.5	40.99	25.44	2.5	51.92	29.03
3.3	28.55	27.07	3.4	33.61	22.34	3.4	8.62	13.41	3.5	41.01	25.81	3.5	52.05	29.36
4.3	28.30	27.31	4.4	32.81	22.63	4.4	8.43	13.59	4.5	41.02	26.16	4.5	52.15	29.69
5.3	28.05	27.53	5.4	32.00	22.88	5.4	8.24	13.80	5.5	41.02	26.50	5.5	52.25	30.01
6.3	27.81	27.73	6.4	31.22	23.13	6.4	8.04	14.01	6.5	41.00	26.84	6.5	52.34	30.32
7.3	27.58	27.92	7.3	30.46	23.36	7.4	7.81	14.21	7.5	40.99	27.15	7.5	52.41	30.62
8.3	27.36	28.10	8.3	29.73	23.57	8.4	7.58	14.42	8.5	40.98	27.44	8.5	52.49	30.90
9.3	27.16	28.29	9.3	29.03	23.80	9.4	7.34	14.63	9.5	40.97	27.73	9.5	52.58	31.18
10.3	26.95	28.47	10.3	28.38	24.02	10.4	7.08	14.82	10.5	40.97	28.01	10.5	52.67	31.45
11.3	26.75	28.66	11.3	27.72	24.26	11.3	6.81	14.97	11.5	40.99	28.32	11.5	52.77	31.72
12.3	26.55	28.86	12.3	27.07	24.53	12.3	6.54	15.12	12.4	41.00	28.63	12.5	52.88	32.00
13.3	26.36	29.09	13.3	26.39	24.79	13.3	6.29	15.25	13.4	41.04	28.96	13.5	53.01	32.31
14.3	26.13	29.33	14.3	25.65	25.06	14.3	6.04	15.35	14.4	41.05	29.31	14.5	53.13	32.62
15.3	25.89	29.55	15.3	24.82	25.33	15.3	5.80	15.45	15.4	41.06	29.68	15.5	53.24	32.96
16.3	25.61	29.75	16.3	23.92	25.61	16.3	5.57	15.53	16.4	41.03	30.05	16.5	53.34	33.32
17.3	25.33	29.95	17.3	22.95	25.86	17.3	5.35	15.62	17.4	41.00	30.43	17.5	53.41	33.69
18.3	25.04	30.13	18.3	21.93	26.07	18.3	5.13	15.71	18.4	40.94	30.77	18.5	53.45	34.04
19.3	24.75	30.27	19.3	20.93	26.27	19.3	4.91	15.84	19.4	40.86	31.10	19.5	53.49	34.38
20.3	24.46	30.40	20.3	19.95	26.45	20.3	4.67	15.97	20.4	40.77	31.40	20.5	53.49	34.72
21.3	24.21	30.50	21.3	19.04	26.59	21.3	4.40	16.11	21.4	40.68	31.69	21.5	53.51	35.02
22.3	23.97	30.60	22.3	18.19	26.74	22.3	4.13	16.25	22.4	40.63	31.95	22.5	53.52	35.28
23.3	23.74	30.71	23.3	17.39	26.89	23.3	3.85	16.36	23.4	40.57	32.22	23.5	53.56	35.55
24.3	23.52	30.84	24.3	16.62	27.07	24.3	3.54	16.46	24.4	40.53	32.48	24.5	53.60	35.81
25.3	23.29	30.97	25.3	15.84	27.24	25.3	3.25	16.51	25.4	40.49	32.75	25.5	53.66	36.11
26.3	23.06	31.12	26.3	15.01	27.44	26.3	2.97	16.57	26.4	40.45	33.06	26.5	53.71	36.40
27.3	22.80	31.27	27.3	14.11	27.64	27.3	2.69	16.60	27.4	40.41	33.37	27.5	53.77	36.72
28.3	22.53	31.40	28.3	13.13	27.84	28.3	2.42	16.61	28.4	40.33	33.69	28.5	53.81	37.07
29.3	22.24	31.54	29.3	12.07	28.02	29.3	2.18	16.62	29.4	40.24	34.02	29.5	53.83	37.42
30.3	21.93	31.63	30.3	10.97	28.17	30.3	1.94	16.62	30.4	40.14	34.34	30.5	53.82	37.78
31.3	21.62	31.72	31.3	9.86	28.31	31.3	1.69	16.67	31.4	40.01	34.65	31.5	53.79	38.13
13.74 +13.70			50.87 +50.86			11.92 -11.88			12.31 +12.27			11.85 +11.81		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

81 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 5 46	° ' -84 49	Dec.	h m 6 46	° ' -80 43	Dec.	h m 7 3	° ' +87 10	Dec.	h m 7 14	° ' +82 34	Dec.	h m 7 16	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	14.65	39.32	0.6	59.55	32.19	0.6	2.58	36.42	0.6	6.39	10.16	0.6	14.57	1.97
1.5	14.67	39.63	1.6	59.60	32.49	1.6	3.01	36.64	1.6	6.57	10.37	1.6	14.75	2.26
2.5	14.70	39.94	2.6	59.66	32.79	2.6	3.40	36.89	2.6	6.73	10.59	2.6	14.93	2.53
3.5	14.73	40.25	3.6	59.72	33.08	3.6	3.76	37.17	3.6	6.88	10.82	3.6	15.12	2.80
4.5	14.78	40.56	4.6	59.78	33.38	4.6	4.10	37.43	4.6	7.02	11.06	4.6	15.32	3.08
5.5	14.82	40.89	5.6	59.83	33.69	5.6	4.42	37.69	5.6	7.15	11.30	5.6	15.53	3.35
6.5	14.86	41.24	6.6	59.89	34.01	6.6	4.71	37.94	6.6	7.28	11.53	6.6	15.75	3.64
7.5	14.89	41.60	7.6	59.95	34.36	7.6	4.99	38.19	7.6	7.39	11.76	7.6	15.96	3.96
8.5	14.91	41.96	8.6	60.01	34.72	8.6	5.27	38.42	8.6	7.50	11.97	8.6	16.16	4.29
9.5	14.92	42.36	9.6	60.06	35.10	9.6	5.55	38.64	9.6	7.62	12.17	9.6	16.35	4.64
10.5	14.93	42.75	10.6	60.10	35.50	10.6	5.84	38.86	10.6	7.75	12.36	10.6	16.53	5.01
11.5	14.93	43.13	11.6	60.15	35.89	11.6	6.14	39.09	11.6	7.87	12.56	11.6	16.68	5.37
12.5	14.89	43.51	12.6	60.18	36.28	12.6	6.46	39.31	12.6	7.99	12.75	12.6	16.81	5.73
13.5	14.85	43.88	13.6	60.20	36.67	13.6	6.80	39.54	13.6	8.15	12.97	13.6	16.91	6.10
14.5	14.81	44.22	14.6	60.22	37.03	14.6	7.14	39.80	14.6	8.30	13.19	14.6	16.99	6.44
15.5	14.76	44.55	15.5	60.24	37.37	15.6	7.49	40.07	15.6	8.45	13.45	15.6	17.05	6.78
16.5	14.71	44.87	16.5	60.26	37.70	16.6	7.82	40.37	16.6	8.59	13.72	16.6	17.11	7.10
17.5	14.67	45.17	17.5	60.27	38.02	17.6	8.11	40.69	17.6	8.71	14.00	17.6	17.19	7.40
18.5	14.64	45.49	18.5	60.29	38.35	18.6	8.36	41.00	18.6	8.82	14.29	18.6	17.27	7.70
19.5	14.61	45.81	19.5	60.31	38.68	19.5	8.58	41.30	19.6	8.92	14.59	19.6	17.37	8.01
20.5	14.58	46.14	20.5	60.33	39.03	20.5	8.77	41.59	20.6	9.01	14.87	20.6	17.48	8.34
21.5	14.55	46.51	21.5	60.35	39.41	21.5	8.94	41.87	21.6	9.08	15.12	21.6	17.60	8.70
22.5	14.51	46.90	22.5	60.37	39.81	22.5	9.11	42.12	22.5	9.16	15.36	22.5	17.70	9.07
23.5	14.45	47.29	23.5	60.39	40.22	23.5	9.30	42.36	23.5	9.25	15.59	23.5	17.77	9.46
24.5	14.37	47.68	24.5	60.40	40.64	24.5	9.51	42.61	24.5	9.33	15.82	24.5	17.83	9.87
25.5	14.28	48.05	25.5	60.40	41.04	25.5	9.73	42.87	25.5	9.44	16.04	25.5	17.85	10.27
26.5	14.17	48.42	26.5	60.39	41.43	26.5	9.98	43.14	26.5	9.55	16.29	26.5	17.85	10.65
27.5	14.07	48.75	27.5	60.38	41.80	27.5	10.21	43.43	27.5	9.65	16.55	27.5	17.82	11.02
28.5	13.97	49.07	28.5	60.36	42.15	28.5	10.44	43.75	28.5	9.75	16.84	28.5	17.79	11.37
29.5	13.86	49.36	29.5	60.34	42.49	29.5	10.65	44.09	29.5	9.85	17.15	29.5	17.76	11.71
30.5	13.76	49.67	30.5	60.33	42.82	30.5	10.83	44.43	30.5	9.94	17.47	30.5	17.75	12.03
31.5	13.67	49.98	31.5	60.32	43.16	31.5	10.97	44.78	31.5	10.00	17.79	31.5	17.74	12.37
11.10 -11.05			6.20 -6.12			20.31 +20.28			7.73 +7.67			18.50 -18.48		
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 8 17	° ' +88 52	Dec.	h m 9 8	° ' -85 19	Dec.	h m 9 25	° ' +81 41	Dec.	h m 9 36	° ' -80 34	Dec.	h m 10 21	° ' +82 58
	s	"		s	"		s	"		s	"		s	"
0.7	42.95	30.02	0.7	54.34	56.84	0.7	35.65	3.50	0.7	22.58	7.29	0.7	15.22	11.80
1.7	44.21	30.16	1.7	54.55	57.04	1.7	35.85	3.49	1.7	22.71	7.48	1.7	15.45	11.71
2.6	45.41	30.31	2.7	54.76	57.22	2.7	36.03	3.52	2.7	22.83	7.62	2.7	15.67	11.65
3.6	46.56	30.48	3.7	54.98	57.40	3.7	36.22	3.56	3.7	22.95	7.77	3.7	15.87	11.61
4.6	47.65	30.66	4.7	55.21	57.58	4.7	36.39	3.60	4.7	23.08	7.92	4.7	16.08	11.60
5.6	48.68	30.83	5.7	55.44	57.75	5.7	36.55	3.66	5.7	23.20	8.06	5.7	16.27	11.59
6.6	49.64	31.01	6.7	55.68	57.93	6.7	36.70	3.74	6.7	23.33	8.22	6.7	16.47	11.58
7.6	50.57	31.19	7.7	55.93	58.13	7.7	36.86	3.81	7.7	23.46	8.41	7.7	16.64	11.57
8.6	51.47	31.34	8.7	56.17	58.36	8.7	36.99	3.87	8.7	23.60	8.61	8.7	16.82	11.56
9.6	52.37	31.49	9.7	56.41	58.59	9.7	37.14	3.92	9.7	23.74	8.83	9.7	16.99	11.54
10.6	53.29	31.63	10.7	56.66	58.86	10.7	37.28	3.97	10.7	23.87	9.06	10.7	17.17	11.51
11.6	54.24	31.78	11.7	56.90	59.13	11.7	37.44	4.02	11.7	24.00	9.33	11.7	17.34	11.48
12.6	55.24	31.91	12.7	57.11	59.42	12.7	37.61	4.04	12.7	24.13	9.59	12.7	17.54	11.43
13.6	56.30	32.08	13.7	57.31	59.71	13.7	37.78	4.08	13.7	24.25	9.86	13.7	17.73	11.38
14.6	57.38	32.24	14.7	57.50	60.00	14.7	37.96	4.12	14.7	24.36	10.13	14.7	17.96	11.33
15.6	58.49	32.43	15.6	57.67	60.29	15.7	38.14	4.20	15.7	24.47	10.40	15.7	18.17	11.33
16.6	59.58	32.64	16.6	57.84	60.56	16.7	38.33	4.30	16.7	24.58	10.64	16.7	18.40	11.33
17.6	60.61	32.88	17.6	58.00	60.81	17.7	38.50	4.42	17.7	24.67	10.89	17.7	18.62	11.37
18.6	61.55	33.14	18.6	58.17	61.04	18.7	38.66	4.56	18.7	24.77	11.12	18.7	18.82	11.43
19.6	62.40	33.37	19.6	58.35	61.28	19.7	38.81	4.71	19.7	24.87	11.35	19.7	19.01	11.51
20.6	63.15	33.62	20.6	58.54	61.55	20.6	38.95	4.85	20.7	24.98	11.59	20.7	19.19	11.59
21.6	63.86	33.86	21.6	58.74	61.83	21.6	39.08	4.99	21.6	25.10	11.86	21.7	19.36	11.65
22.6	64.55	34.06	22.6	58.94	62.13	22.6	39.20	5.12	22.6	25.23	12.13	22.7	19.52	11.70
23.6	65.27	34.26	23.6	59.15	62.44	23.6	39.33	5.22	23.6	25.35	12.45	23.7	19.68	11.75
24.6	66.02	34.46	24.6	59.34	62.78	24.6	39.47	5.31	24.6	25.45	12.77	24.7	19.84	11.78
25.6	66.84	34.64	25.6	59.51	63.15	25.6	39.61	5.40	25.6	25.56	13.11	25.7	20.03	11.82
26.6	67.68	34.84	26.6	59.66	63.52	26.6	39.76	5.51	26.6	25.66	13.44	26.7	20.21	11.85
27.6	68.56	35.07	27.6	59.80	63.86	27.6	39.92	5.64	27.6	25.76	13.77	27.7	20.42	11.90
28.6	69.43	35.33	28.6	59.93	64.19	28.6	40.08	5.78	28.6	25.84	14.10	28.7	20.62	11.98
29.6	70.25	35.60	29.6	60.03	64.51	29.6	40.24	5.96	29.6	25.93	14.40	29.7	20.83	12.07
30.6	71.03	35.88	30.6	60.15	64.80	30.6	40.38	6.14	30.6	26.00	14.71	30.7	21.02	12.18
31.6	71.73	36.17	31.6	60.28	65.10	31.6	40.52	6.33	31.6	26.08	14.99	31.7	21.21	12.33
50.96 +50.95			12.29 -12.25			6.91 +6.84			6.10 -6.02			8.17 +8.11		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "
	10 59	-84 8		12 14	+88 8		12 46	-84 40		12 48	+83 51		13 27	-85 21
0.8	53.77	54.27	0.8	12.48	52.77	0.8	7.04	29.18	0.8	24.37	9.31	0.9	14.92	49.99
1.8	53.97	54.33	1.8	13.13	52.53	1.8	7.25	29.10	1.8	24.55	9.02	1.9	15.16	49.86
2.8	54.18	54.38	2.8	13.79	52.31	2.8	7.47	29.02	2.8	24.73	8.74	2.9	15.39	49.71
3.8	54.39	54.42	3.8	14.46	52.12	3.8	7.67	28.93	3.8	24.92	8.48	3.9	15.60	49.57
4.8	54.59	54.45	4.8	15.12	51.94	4.8	7.89	28.83	4.8	25.11	8.24	4.9	15.82	49.41
5.8	54.81	54.47	5.8	15.77	51.77	5.8	8.11	28.71	5.8	25.29	8.03	5.9	16.05	49.24
6.7	55.04	54.50	6.8	16.39	51.61	6.8	8.34	28.60	6.8	25.46	7.83	6.9	16.29	49.07
7.7	55.27	54.55	7.8	16.98	51.45	7.8	8.57	28.49	7.8	25.63	7.62	7.8	16.55	48.90
8.7	55.51	54.63	8.8	17.55	51.31	8.8	8.84	28.38	8.8	25.80	7.43	8.8	16.82	48.74
9.7	55.76	54.71	9.8	18.11	51.16	9.8	9.10	28.29	9.8	25.95	7.22	9.8	17.10	48.59
10.7	56.01	54.80	10.8	18.66	50.99	10.8	9.37	28.22	10.8	26.10	7.02	10.8	17.41	48.45
11.7	56.26	54.92	11.8	19.22	50.82	11.8	9.66	28.18	11.8	26.26	6.81	11.8	17.71	48.34
12.7	56.51	55.07	12.8	19.80	50.63	12.8	9.94	28.16	12.8	26.43	6.58	12.8	18.03	48.25
13.7	56.74	55.24	13.8	20.40	50.45	13.8	10.22	28.16	13.8	26.61	6.34	13.8	18.32	48.19
14.7	56.96	55.40	14.8	21.07	50.26	14.8	10.48	28.17	14.8	26.81	6.10	14.8	18.62	48.13
15.7	57.16	55.55	15.8	21.78	50.08	15.8	10.73	28.19	15.8	27.02	5.87	15.8	18.90	48.08
16.7	57.36	55.71	16.8	22.52	49.92	16.8	10.97	28.21	16.8	27.24	5.65	16.8	19.17	48.04
17.7	57.55	55.86	17.8	23.27	49.79	17.8	11.20	28.21	17.8	27.45	5.45	17.8	19.42	47.99
18.7	57.75	55.98	18.8	24.02	49.69	18.8	11.43	28.19	18.8	27.67	5.27	18.8	19.67	47.93
19.7	57.94	56.10	19.8	24.73	49.60	19.8	11.66	28.16	19.8	27.88	5.12	19.8	19.93	47.85
20.7	58.17	56.24	20.8	25.38	49.52	20.8	11.90	28.14	20.8	28.07	4.99	20.8	20.21	47.75
21.7	58.39	56.38	21.8	26.01	49.46	21.8	12.18	28.12	21.8	28.26	4.88	21.8	20.51	47.66
22.7	58.63	56.55	22.8	26.61	49.39	22.8	12.46	28.10	22.8	28.44	4.76	22.8	20.82	47.59
23.7	58.87	56.74	23.8	27.18	49.31	23.8	12.75	28.11	23.8	28.61	4.63	23.8	21.15	47.54
24.7	59.11	56.96	24.8	27.76	49.22	24.8	13.05	28.15	24.8	28.79	4.48	24.8	21.49	47.51
25.7	59.34	57.18	25.7	28.37	49.12	25.8	13.35	28.22	25.8	28.97	4.32	25.8	21.83	47.50
26.7	59.55	57.42	26.7	29.03	49.01	26.8	13.63	28.30	26.8	29.17	4.15	26.8	22.16	47.51
27.7	59.75	57.66	27.7	29.73	48.91	27.8	13.90	28.38	27.8	29.39	4.00	27.8	22.47	47.55
28.7	59.94	57.89	28.7	30.46	48.82	28.8	14.15	28.47	28.8	29.61	3.85	28.8	22.76	47.58
29.7	60.12	58.12	29.7	31.22	48.76	29.8	14.39	28.55	29.8	29.83	3.72	29.8	23.05	47.60
30.7	60.29	58.33	30.7	31.98	48.72	30.8	14.63	28.64	30.8	30.07	3.62	30.8	23.32	47.62
31.7	60.47	58.53	31.7	32.73	48.70	31.8	14.86	28.71	31.8	30.30	3.53	31.8	23.59	47.62
9.81	-9.76		30.93	+30.91		10.77	-10.73		9.34	+9.28		12.37	-12.33	
10 <sup>h</sup> 59 <sup>m</sup>	55 <sup>s</sup> .280		12 <sup>h</sup> 14 <sup>m</sup>	28 <sup>s</sup> .425		12 <sup>h</sup> 46 <sup>m</sup>	7 <sup>s</sup> .152		12 <sup>h</sup> 48 <sup>m</sup>	30 <sup>s</sup> .418		13 <sup>h</sup> 27 <sup>m</sup>	14 <sup>s</sup> .624	
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Dec.	14 13	−83 17	Dec.	15 2	+87 32	Dec.	15 24	−84 11	Dec.	16 54	+82 10	Dec.	17 16	−80 47
	s	"		s	"		s	"		s	"		s	"
0.9	30.10	29.35	0.9	48.48	44.85	0.9	0.60	38.97	1.0	7.82	27.13	1.0	0.43	13.82
1.9	30.25	29.18	1.9	48.61	44.47	1.9	0.72	38.73	2.0	7.77	26.76	2.0	0.45	13.55
2.9	30.38	28.98	2.9	48.75	44.08	2.9	0.82	38.49	3.0	7.74	26.37	3.0	0.47	13.29
3.9	30.52	28.80	3.9	48.93	43.72	3.9	0.92	38.24	4.0	7.72	25.98	4.0	0.48	13.02
4.9	30.64	28.61	4.9	49.12	43.38	4.9	1.02	37.98	4.9	7.70	25.61	5.0	0.48	12.73
5.9	30.78	28.39	5.9	49.31	43.05	5.9	1.13	37.72	5.9	7.68	25.25	6.0	0.48	12.42
6.9	30.93	28.18	6.9	49.50	42.73	6.9	1.25	37.43	6.9	7.67	24.91	7.0	0.49	12.11
7.9	31.09	27.96	7.9	49.69	42.42	7.9	1.37	37.13	7.9	7.66	24.58	8.0	0.50	11.78
8.9	31.26	27.74	8.9	49.87	42.14	8.9	1.50	36.84	8.9	7.65	24.25	9.0	0.51	11.42
9.9	31.43	27.54	9.9	50.02	41.83	9.9	1.65	36.54	9.9	7.63	23.94	10.0	0.55	11.08
10.9	31.62	27.34	10.9	50.17	41.53	10.9	1.82	36.25	10.9	7.60	23.62	10.9	0.59	10.74
11.9	31.81	27.16	11.9	50.32	41.23	11.9	2.00	35.97	11.9	7.58	23.30	11.9	0.64	10.41
12.9	32.01	27.01	12.9	50.46	40.90	12.9	2.19	35.74	12.9	7.57	22.95	12.9	0.70	10.07
13.9	32.23	26.88	13.9	50.63	40.56	13.9	2.38	35.51	13.9	7.56	22.60	13.9	0.77	9.76
14.9	32.43	26.78	14.9	50.81	40.22	14.9	2.57	35.32	14.9	7.54	22.23	14.9	0.85	9.48
15.9	32.61	26.69	15.9	51.04	39.85	15.9	2.76	35.13	15.9	7.53	21.84	15.9	0.92	9.21
16.9	32.80	26.59	16.9	51.31	39.50	16.9	2.93	34.96	16.9	7.53	21.44	16.9	0.97	8.95
17.9	32.97	26.48	17.9	51.61	39.17	17.9	3.09	34.77	17.9	7.56	21.03	17.9	1.03	8.69
18.9	33.13	26.35	18.9	51.92	38.85	18.9	3.24	34.58	18.9	7.58	20.66	18.9	1.08	8.42
19.8	33.29	26.22	19.9	52.24	38.55	19.9	3.39	34.36	19.9	7.61	20.29	19.9	1.12	8.14
20.8	33.46	26.07	20.9	52.55	38.27	20.9	3.56	34.13	20.9	7.65	19.96	20.9	1.16	7.82
21.8	33.65	25.92	21.9	52.84	38.03	21.9	3.73	33.87	21.9	7.68	19.65	21.9	1.21	7.51
22.8	33.87	25.77	22.9	53.10	37.78	22.9	3.92	33.62	22.9	7.70	19.34	22.9	1.27	7.18
23.8	34.09	25.64	23.9	53.34	37.52	23.9	4.14	33.40	23.9	7.72	19.03	23.9	1.35	6.85
24.8	34.32	25.55	24.9	53.58	37.26	24.9	4.37	33.20	24.9	7.74	18.72	24.9	1.44	6.52
25.8	34.55	25.48	25.9	53.82	37.00	25.9	4.61	33.00	25.9	7.75	18.39	25.9	1.53	6.21
26.8	34.77	25.42	26.9	54.09	36.72	26.9	4.84	32.83	26.9	7.76	18.06	26.9	1.64	5.93
27.8	35.00	25.37	27.9	54.39	36.42	27.9	5.07	32.69	27.9	7.80	17.69	27.9	1.75	5.67
28.8	35.19	25.34	28.9	54.73	36.13	28.9	5.28	32.56	28.9	7.85	17.31	28.9	1.84	5.43
29.8	35.39	25.32	29.9	55.10	35.83	29.9	5.48	32.43	29.9	7.89	16.93	29.9	1.93	5.20
30.8	35.58	25.27	30.9	55.49	35.55	30.9	5.68	32.30	30.9	7.94	16.57	30.9	2.02	4.96
31.8	35.76	25.23	31.9	55.90	35.28	31.9	5.87	32.15	31.9	8.00	16.21	31.9	2.10	4.70
8.56	−8.50		23.34	+23.32		9.88	−9.83		7.34	+7.27		6.24	−6.16	
14 <sup>h</sup> 13 <sup>m</sup>	27°.793		15 <sup>h</sup> 3 <sup>m</sup>	41°.175		15 <sup>h</sup> 23 <sup>m</sup>	56°.594		16 <sup>h</sup> 54 <sup>m</sup>	25°.488		17 <sup>h</sup> 15 <sup>m</sup>	54°.896	
−83° 17'	21''.03		+87° 33'	10''.52		−84° 11'	30''.39		+82° 10'	32''.75		−80° 47'	6''.56	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "
	17 58	+86 36		18 6	-87 39		18 59	+89 1		19 28	-89 13		20 48	+82 13
1.1	15.43	57.83	1.1	25.40	58.40	1.1	64.72	20.32	1.1	25.13	32.59	1.2	30.51	64.61
2.1	15.20	57.50	2.1	25.34	58.10	2.1	63.59	20.06	2.1	24.41	32.33	2.2	30.33	64.51
3.0	15.00	57.16	3.1	25.26	57.81	3.1	62.55	19.79	3.1	23.66	32.07	3.2	30.18	64.37
4.0	14.81	56.81	4.1	25.17	57.54	4.1	61.58	19.52	4.1	22.84	31.81	4.2	30.02	64.23
5.0	14.66	56.47	5.0	25.06	57.22	5.1	60.68	19.24	5.1	21.98	31.55	5.2	29.86	64.07
6.0	14.50	56.14	6.0	24.93	56.90	6.1	59.84	18.96	6.1	21.10	31.28	6.2	29.71	63.90
7.0	14.36	55.83	7.0	24.82	56.56	7.1	59.05	18.69	7.1	20.18	31.00	7.2	29.56	63.74
8.0	14.22	55.52	8.0	24.71	56.22	8.1	58.29	18.43	8.1	19.28	30.69	8.2	29.43	63.59
9.0	14.09	55.23	9.0	24.65	55.86	9.1	57.54	18.20	9.1	18.44	30.35	9.2	29.29	63.44
10.0	13.96	54.95	10.0	24.59	55.48	10.1	56.76	17.98	10.1	17.65	30.01	10.1	29.17	63.31
11.0	13.82	54.68	11.0	24.59	55.11	11.1	55.97	17.76	11.1	16.96	29.67	11.1	29.03	63.21
12.0	13.67	54.40	12.0	24.62	54.73	12.1	55.14	17.53	12.1	16.37	29.33	12.1	28.90	63.10
13.0	13.49	54.11	13.0	24.69	54.38	13.1	54.25	17.30	13.1	15.92	28.98	13.1	28.76	62.97
14.0	13.32	53.79	14.0	24.79	54.04	14.1	53.32	17.03	14.1	15.57	28.63	14.1	28.62	62.84
15.0	13.17	53.45	15.0	24.90	53.71	15.1	52.41	16.76	15.1	15.30	28.29	15.1	28.46	62.67
16.0	13.02	53.09	16.0	25.02	53.39	16.1	51.51	16.45	16.1	15.05	27.98	16.1	28.31	62.50
17.0	12.88	52.72	17.0	25.12	53.11	17.1	50.68	16.13	17.1	14.78	27.69	17.1	28.17	62.29
18.0	12.79	52.34	18.0	25.19	52.82	18.1	49.96	15.81	18.1	14.44	27.39	18.1	28.02	62.06
19.0	12.73	51.97	19.0	25.24	52.51	19.0	49.32	15.47	19.1	14.03	27.10	19.1	27.88	61.83
20.0	12.67	51.62	20.0	25.27	52.20	20.0	48.79	15.14	20.1	13.53	26.79	20.1	27.75	61.60
21.0	12.63	51.28	21.0	25.29	51.85	21.0	48.33	14.84	21.1	13.02	26.46	21.1	27.64	61.37
21.9	12.60	51.01	22.0	25.34	51.47	22.0	47.87	14.56	22.1	12.53	26.09	22.1	27.54	61.17
22.9	12.56	50.72	22.9	25.44	51.10	23.0	47.41	14.32	23.1	12.11	25.73	23.1	27.44	60.99
23.9	12.50	50.42	23.9	25.58	50.72	24.0	46.91	14.08	24.1	11.82	25.35	24.1	27.33	60.82
24.9	12.44	50.13	24.9	25.75	50.36	25.0	46.35	13.82	25.1	11.65	24.95	25.1	27.22	60.64
25.9	12.35	49.82	25.9	25.97	50.02	26.0	45.74	13.55	26.0	11.62	24.56	26.1	27.11	60.45
26.9	12.28	49.49	26.9	26.21	49.68	27.0	45.12	13.26	27.0	11.66	24.20	27.1	27.00	60.25
27.9	12.22	49.15	27.9	26.44	49.34	28.0	44.51	12.94	28.0	11.76	23.85	28.1	26.87	60.02
28.9	12.17	48.78	28.9	26.67	49.06	29.0	43.97	12.61	29.0	11.86	23.53	29.1	26.74	59.78
29.9	12.16	48.41	29.9	26.90	43.78	30.0	43.48	12.25	30.0	11.93	23.20	30.1	26.61	59.51
30.9	12.15	48.03	30.9	27.09	48.49	31.0	43.10	11.89	31.0	11.95	22.88	31.1	26.51	59.23
31.9	12.18	47.67	31.9	27.28	48.17	32.0	42.78	11.54	32.0	11.93	22.57	32.1	26.41	58.93
16.94 +16.91			24.54 -24.52			58.55 +58.54			73.89 -73.88			7.40 +7.33		
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			γ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "
	21 38	−83 5		22 16	−86 23		22 37	−81 48		23 27	+86 51		23 47	−82 28
1.2	28.24	65.65	1.2	21.49	24.54	1.2	46.66	58.62	1.3	48.47	43.65	1.3	23.78	42.47
2.2	28.11	65.55	2.2	21.20	24.46	2.2	46.53	58.58	2.3	48.06	43.78	2.3	23.64	42.50
3.2	27.98	65.44	3.2	20.93	24.38	3.2	46.41	58.54	3.3	47.65	43.92	3.3	23.50	42.55
4.2	27.83	65.34	4.2	20.60	24.31	4.2	46.28	58.51	4.3	47.23	44.03	4.3	23.36	42.60
5.2	27.68	65.23	5.2	20.28	24.25	5.2	46.14	58.48	5.3	46.82	44.13	5.3	23.20	42.66
6.2	27.51	65.10	6.2	19.94	24.18	6.2	45.99	58.45	6.3	46.43	44.21	6.3	23.04	42.72
7.2	27.34	64.97	7.2	19.60	24.10	7.2	45.84	58.41	7.3	46.05	44.29	7.3	22.86	42.79
8.2	27.17	64.82	8.2	19.24	24.00	8.2	45.69	58.35	8.3	45.68	44.36	8.3	22.69	42.85
9.2	26.99	64.65	9.2	18.88	23.87	9.2	45.52	58.27	9.3	45.32	44.45	9.3	22.51	42.89
10.2	26.82	64.47	10.2	18.52	23.73	10.2	45.36	58.18	10.3	44.99	44.54	10.3	22.33	42.90
11.2	26.67	64.27	11.2	18.18	23.57	11.2	45.21	58.06	11.3	44.65	44.61	11.3	22.14	42.90
12.2	26.52	64.04	12.2	17.84	23.39	12.2	45.06	57.93	12.3	44.32	44.72	12.3	21.97	42.86
13.2	26.39	63.81	13.2	17.52	23.20	13.2	44.91	57.77	13.3	43.94	44.83	13.3	21.80	42.82
14.2	26.26	63.57	14.2	17.24	23.02	14.2	44.79	57.62	14.2	43.55	44.94	14.3	21.64	42.76
15.2	26.15	63.35	15.2	16.99	22.82	15.2	44.68	57.47	15.2	43.14	45.04	15.3	21.50	42.68
16.2	26.05	63.13	16.2	16.74	22.61	16.2	44.58	57.30	16.2	42.72	45.14	16.3	21.36	42.62
17.2	25.95	62.93	17.2	16.49	22.43	17.2	44.46	57.15	17.2	42.27	45.20	17.3	21.22	42.56
18.2	25.83	62.74	18.2	16.22	22.29	18.2	44.34	57.04	18.2	41.81	45.23	18.2	21.08	42.52
19.2	25.71	62.56	19.2	15.96	22.14	19.2	44.22	56.94	19.2	41.38	45.24	19.2	20.93	42.49
20.2	25.58	62.37	20.2	15.64	21.97	20.2	44.09	56.82	20.2	40.98	45.24	20.2	20.76	42.47
21.2	25.44	62.16	21.2	15.32	21.80	21.2	43.96	56.69	21.2	40.60	45.22	21.2	20.59	42.43
22.2	25.30	61.93	22.2	15.02	21.61	22.2	43.80	56.55	22.2	40.23	45.21	22.2	20.41	42.39
23.1	25.15	61.67	23.2	14.69	21.40	23.2	43.65	56.37	23.2	39.90	45.23	23.2	20.23	42.32
24.1	25.01	61.39	24.2	14.38	21.15	24.2	43.51	56.16	24.2	39.57	45.24	24.2	20.05	42.23
25.1	24.90	61.10	25.2	14.09	20.88	25.2	43.38	55.93	25.2	39.23	45.27	25.2	19.87	42.11
26.1	24.79	60.80	26.2	13.82	20.61	26.2	43.26	55.70	26.2	38.86	45.31	26.2	19.71	41.97
27.1	24.70	60.51	27.2	13.59	20.35	27.2	43.16	55.46	27.2	38.46	45.34	27.2	19.57	41.83
28.1	24.62	60.23	28.2	13.37	20.10	28.2	43.05	55.23	28.2	38.05	45.35	28.2	19.42	41.69
29.1	24.55	59.96	29.2	13.16	19.85	29.2	42.96	55.04	29.2	37.63	45.34	29.2	19.28	41.56
30.1	24.47	59.70	30.2	12.96	19.61	30.2	42.87	54.83	30.2	37.20	45.30	30.2	19.15	41.43
31.1	24.38	59.45	31.2	12.74	19.39	31.2	42.76	54.63	31.2	36.77	45.25	31.2	19.01	41.31
32.1	24.30	59.20	32.1	12.52	19.16	32.2	42.66	54.45	32.2	36.35	45.19	32.2	18.87	41.19
8.32	−8.26		15.88	−15.85		7.02	−6.95		18.27	+18.24		7.64	−7.57	
21 <sup>h</sup> 38 <sup>m</sup>	19 <sup>s</sup> .542		22 <sup>h</sup> 16 <sup>m</sup>	8 <sup>s</sup> .656		22 <sup>h</sup> 37 <sup>m</sup>	39 <sup>s</sup> .016		23 <sup>h</sup> 27 <sup>m</sup>	44 <sup>s</sup> .125		23 <sup>h</sup> 47 <sup>m</sup>	16 <sup>s</sup> .424	
−83° 6'	6'' .99		−86° 23'	27'' .13		−81° 49'	2'' .34		+86° 50'	58'' .89		−82° 28'	48'' .42	





**FOR THE UPPER TRANSIT AT WASHINGTON.**

## APPARENT PLACES OF STARS, 1917.

FOR THE UPPER TRANSIT AT WASHINGTON.

Phoenixia.  
Mag. 2.4

ght nation.	Declina- tion.
m	c
22	-42 44
36	92.28
18 188	92.16 12
39 179	91.58 56
38 161	90.57 101
37 141	89.16 141
112	179
35 79	87.37
76 41	85.24 213
35 2	82.82 242
37 48	80.14 268
35 99	77.29 285
34	74.30 299
32 148	71.22 308
30 198	68.14 308
75 245	65.12 302
33 288	62.20 292
323	272
36 364	59.48 247
10 374	57.01 216
14 384	54.85 180
38 385	53.05 139
33 375	51.66 94
58 354	50.72 47
12 327	50.25 2
39 288	50.27 46
27 245	50.73 98
72 195	51.66 132
37 143	52.99 168
10 89	54.67 198
39 38	56.63 217
37 13	58.80 226
24 58	61.06 237
36 97	63.33 220
39 132	65.53 201
37 138	67.54 176
79 177	69.30 143
32 180	70.73 104
12 196	71.77 68
16 196	72.40 18
21	72.58
17	84.20
32	-0.924
8	+0.06
	+0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Andromedæ. Mag. 4.5			δ Andromedæ. Mag. 3.5			α Cassiopeiæ. (Schedir.) Var. 2.2-2.8			μ Phœnicis. Mag. 4.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	0	34	+28 51	0	34	+30 24	0	35	+56 4	0	37	-46 31
	s		"	s		"	s		"	s		"
Jan. 0.2	10.879		56.04	54.075		40.59	48.101		79.47	25.410		96.09
10.2	10.742	137	55.33 71	53.936	139	39.88 71	47.827	274	79.06 41	25.194	216	96.00 9
20.2	10.605	137	54.36 97	53.795	141	38.92 96	47.554	273	78.15 91	24.986	208	95.44 56
30.2	10.475	130	53.16 120	53.661	134	37.70 122	47.293	261	76.78 137	24.792	194	94.42 102
Feb. 9.1	10.358	117	51.80 136	53.542	119	36.31 139	47.056	237	74.99 179	24.620	172	92.95 147
		97	147		100	152		199	213		146	186
19.1	10.261		50.33	53.442		34.79	46.857	150	72.86	24.474		91.09
Mar. 1.1	10.193	68	48.81 152	53.371	71	33.22 157	46.707	90	70.50 236	24.363	111	88.86 223
11.1	10.158	35	47.32 149	53.334	37	31.66 156	46.617	23	68.00 250	24.292	71	86.31 255
21.0	10.163	5	45.93 139	53.339	5	30.20 146	46.594	23	65.46 254	24.265	27	83.51 280
31.0	10.213	50	44.73 120	53.390	51	28.90 130	46.644	50	62.99 247	24.288	23	80.49 302
		98	98		98	105		124	230		74	315
Apr. 10.0	10.311		43.75	53.488		27.85	46.768		60.69	24.362		77.34
19.9	10.457	146	43.07 68	53.636	148	27.09 76	46.969	201	58.68 201	24.490	128	74.11 323
29.9	10.649	192	42.73 34	53.832	196	26.66 43	47.240	271	57.01 167	24.672	182	70.87 324
May 9.9	10.884	235	42.73 0	54.071	239	26.60 6	47.576	336	55.76 125	24.906	234	67.69 318
19.9	11.160	276	43.12 39	54.349	278	26.92 32	47.968	392	54.96 80	25.187	281	64.64 305
		307	76		311	68		437	31		322	287
29.8	11.467		43.88	54.660		27.60	48.405		54.65	25.509		61.77
June 8.8	11.796	329	44.99 111	54.995	335	28.66 106	48.875	470	54.84 19	25.865	356	59.18 259
18.8	12.141	345	46.41 142	55.346	351	30.05 139	49.365	490	55.53 69	26.246	381	56.91 227
28.8	12.494	353	48.13 172	55.702	356	31.74 169	49.863	498	56.69 116	26.643	397	55.01 190
July 8.7	12.842	348	50.09 196	56.055	353	33.68 194	50.354	491	58.30 161	27.044	401	53.56 145
		338	215		342	216		476	201		393	99
18.7	13.180		52.24	56.397		35.84	50.830		60.31	27.437		52.57
28.7	13.499	319	54.53 229	56.720	323	38.13 229	51.277	447	62.67 236	27.816	379	52.07 50
Aug. 7.6	13.790	291	56.89 236	57.016	296	40.53 240	51.687	410	65.34 267	28.166	350	52.08 1
17.6	14.050	260	59.29 240	57.280	264	42.97 244	52.053	366	68.24 290	28.480	314	52.59 51
27.6	14.275	225	61.66 237	57.510	230	45.40 243	52.368	315	71.33 309	28.751	271	53.57 98
		187	231		190	237		260	319		222	140
Sept. 6.6	14.462		63.97	57.700		47.77	52.628	204	74.52	28.973		54.97
16.5	14.609	147	66.16 219	57.850	150	50.04 227	52.832	146	77.77 325	29.141	168	56.76 179
26.5	14.717	108	68.20 204	57.961	111	52.16 212	52.978	88	81.00 323	29.252	111	58.86 210
Oct. 6.5	14.787	70	70.07 187	58.033	72	54.12 196	53.066	32	84.15 315	29.307	55	61.17 231
16.5	14.821	34	71.72 165	58.068	35	55.37 175	53.098	32	87.15 300	29.307	0	63.61 244
		1	144		3	152		22	280		50	246
26.4	14.822		73.16	58.071		57.39	53.076		89.95	29.257		66.07
Nov. 5.4	14.793	29	74.33 117	58.042	29	58.66 127	53.004	72	92.48 253	29.163	94	68.46 239
15.4	14.737	56	75.24 91	57.987	55	59.66 100	52.885	119	94.69 221	29.029	134	70.66 220
25.3	14.657	80	75.86 62	57.907	80	60.36 70	52.722	163	96.52 183	28.863	166	72.60 194
Dec. 5.3	14.558	99	76.19 33	57.807	100	60.77 41	52.522	200	97.91 139	28.673	190	74.20 160
		116	3		119	8		231	92		209	118
15.3	14.442		76.22	57.688		60.85	52.291		98.83	28.464		75.38
25.3	14.314	128	75.94 28	57.557	131	60.61 24	52.034	257	99.24 41	28.246	218	76.11 73
35.2	14.178	136	75.39 55	57.418	139	60.09 52	51.763	271	99.14 10	28.025	221	76.37 26
Mean Place	9.953		40.54	53.148		24.57	47.272		56.41	24.283		87.18
Sec δ, Tan δ	1.142		+0.551	1.160		+0.587	1.792		+1.487	1.453		-1.055
D <sub>α</sub> α, D <sub>α</sub> α	+0.06		-0.04	+0.06		-0.04	+0.07		-0.10	+0.06		+0.07
D <sub>δ</sub> δ, D <sub>δ</sub> δ	+0.4		+0.1	+0.4		+0.2	+0.4		+0.2	+0.4		+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.



**FOR THE UPPER TRANSIT AT WASHINGTON.**









FOR THE UPPER TRANSIT AT

.



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Piscium. Mag. 4.7			♎ Persei. Mag. 4.2			♊ Ceti. Mag. 3.6			♋ Piscium. Mag. 4.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 1 37	s 106	° ' " + 5 4	h m 1 38	s 210	° ' " +50 16	h m 1 40	s 127	° ' " -16 21	h m 1 41	s 107	° ' " + 8 44
Jan. 0.3	7.980		12.38	28.556		37.44	14.065		86.76	1.908		34.14
10.3	7.874	106	11.71	28.346	210	37.60	13.938	127	87.51	1.801	107	33.52
20.2	7.754	120	11.06	28.118	228	37.31	13.802	136	88.03	1.681	120	32.87
30.2	7.630	124	10.44	27.882	236	36.58	13.662	140	88.27	1.555	126	32.22
Feb. 9.2	7.507	123	9.89	27.649	233	35.46	13.523	139	88.24	1.429	126	31.59
		116			217			131			118	
19.2	7.391		9.42	27.432		33.97	13.392		87.91	1.311		31.01
Mar. 1.1	7.290	101	9.07	27.241	191	32.18	13.278	114	87.30	1.205	106	30.51
		80			150			93			82	
11.1	7.210		8.86	27.091		30.19	13.185		86.43	1.123		30.12
		50			99			63			55	
21.1	7.160		8.81	26.992		28.06	13.122		85.27	1.068		29.89
		15			39			28			18	
31.0	7.145		8.97	26.953		25.91	13.094		83.86	1.050		29.83
		24			24			11			23	
Apr. 10.0	7.169		9.34	26.977		23.82	13.105		82.19	1.073		29.98
		68						55			65	
20.0	7.237		9.95	27.070		21.87	13.160		80.30	1.138		30.35
		113			161			99			111	
30.0	7.350		10.79	27.231		20.16	13.259		78.21	1.249		30.98
May 9.9	7.505	155	11.87	27.458	227	18.74	13.403	144	75.98	1.404	155	31.83
		197			288			185			197	
19.9	7.702		13.17	27.746		17.68	13.588		73.63	1.601		32.93
		232			341			223			234	
29.9	7.934		14.65	28.087		17.01	13.811		71.21	1.835		34.25
June 8.9	8.199	265	16.33	28.471	384	16.75	14.068	257	68.79	2.101	266	35.75
		289			417			282			290	
18.8	8.488		18.11	28.888		16.92	14.350		66.42	2.391		37.42
		307			441			301			308	
28.8	8.795		19.97	29.329		17.51	14.651		64.15	2.699		39.19
		315			451			311			317	
July 8.8	9.110		21.89	29.780		18.50	14.962		62.07	3.016		41.02
		316			451			315			318	
18.7	9.426		23.76	30.231		19.86	15.277		60.21	3.334		42.87
		307			441			308			312	
28.7	9.733		25.57	30.672		21.58	15.585		58.62	3.646		44.69
		297			423			296			299	
Aug. 7.7	10.030		27.25	31.095		23.59	15.881		57.36	3.945		46.48
		276			395			277			280	
17.7	10.306		28.77	31.490		25.84	16.158		56.43	4.225		48.03
		251			362			252			255	
27.6	10.557		30.10	31.852		28.30	16.410		55.88	4.480		49.47
		222			323			222			229	
Sept. 6.6	10.779		31.21	32.175		30.92	16.632		55.71	4.709		50.72
		193			281			190			197	
16.6	10.972		32.08	32.456		33.62	16.822		55.91	4.906		51.77
		160			235			154			166	
26.6	11.132		32.70	32.691		36.36	16.976		56.44	5.072		52.60
Oct. 6.5	11.260	128	33.10	32.880	189	39.10	17.096	120	57.28	5.206	134	53.19
		96			141			84			102	
16.5	11.356		33.26	33.021		41.78	17.180		58.39	5.308		53.58
		64			94			51			70	
26.5	11.420		33.22	33.115		44.34	17.231		59.68	5.378		53.75
		35			46			19			42	
Nov. 5.4	11.455		33.00	33.161		46.75	17.250		61.11	5.420		53.76
		8			0			12			13	
15.4	11.463		32.64	33.161		48.93	17.238		62.61	5.433		53.61
		19			45			39			14	
25.4	11.444		32.16	33.116		50.85	17.199		64.11	5.419		53.31
		42			89			64			37	
Dec. 5.4	11.402		31.60	33.027		52.44	17.135		65.54	5.382		52.90
		65			130			86			62	
15.3	11.337		30.96	32.897		53.68	17.049		66.84	5.320		52.41
		84			167			106			82	
25.3	11.253		30.29	32.730		54.52	16.943		67.97	5.238		51.85
		101			196			122			101	
35.3	11.152		29.60	32.534		54.93	16.821		68.90	5.137		51.23
Mean Place	6.617		4.95	26.963		16.10	12.695		86.83	0.516		25.46
Sec δ, Tan δ	1.004		+0.089	1.565		+1.203	1.042		-0.294	1.012		+0.154
Dψ α, Dω α	+0.06		-0.01	+0.07		-0.07	+0.06		+0.02	+0.06		-0.01
Dψ δ, Dω δ	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Piscium. Mag. 4.8			$\beta$ Arietis. Mag. 2.7			$\psi$ Phœnicis. Mag. 4.4			$\upsilon$ Ceti. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	1	49	+ 2 46	1	50	+20 24	1	50	-46 41	1	56	-21 28
	s		"	s		"	s		"	s		"
Jan. 0.3	16.855		48.36	4.536		22.54	20.591		100.86	7.101		47.42
10.3	16.750 <sup>105</sup>		47.67 <sup>69</sup>	4.423 <sup>113</sup>		22.13 <sup>41</sup>	20.361 <sup>230</sup>		101.63 <sup>77</sup>	6.971 <sup>130</sup>		48.34 <sup>92</sup>
20.2	16.631 <sup>119</sup>		47.02 <sup>65</sup>	4.295 <sup>128</sup>		21.56 <sup>57</sup>	20.121 <sup>240</sup>		101.90 <sup>27</sup>	6.828 <sup>143</sup>		48.94 <sup>60</sup>
30.2	16.505 <sup>126</sup>		46.43 <sup>59</sup>	4.158 <sup>137</sup>		20.85 <sup>71</sup>	19.877 <sup>244</sup>		101.65 <sup>25</sup>	6.678 <sup>150</sup>		49.23 <sup>29</sup>
Feb. 9.2	16.377 <sup>128</sup>		45.92 <sup>51</sup>	4.020 <sup>138</sup>		20.05 <sup>80</sup>	19.637 <sup>240</sup>		100.90 <sup>75</sup>	6.527 <sup>151</sup>		49.20 <sup>3</sup>
	123		39	133		88	226		123	145		36
19.2	16.254 <sup>109</sup>		45.53 <sup>25</sup>	3.887 <sup>118</sup>		19.17 <sup>91</sup>	19.411 <sup>204</sup>		99.67 <sup>168</sup>	6.382 <sup>133</sup>		48.84 <sup>69</sup>
Mar. 1.1	16.145 <sup>90</sup>		45.28 <sup>11</sup>	3.769 <sup>97</sup>		18.26 <sup>89</sup>	19.207 <sup>176</sup>		97.99 <sup>208</sup>	6.249 <sup>111</sup>		48.15 <sup>100</sup>
11.1	16.055 <sup>61</sup>		45.17 <sup>7</sup>	3.672 <sup>65</sup>		17.37 <sup>83</sup>	19.031 <sup>136</sup>		95.91 <sup>245</sup>	6.138 <sup>84</sup>		47.15 <sup>131</sup>
21.1	15.994 <sup>27</sup>		45.24 <sup>28</sup>	3.607 <sup>27</sup>		16.54 <sup>71</sup>	18.895 <sup>90</sup>		93.46 <sup>275</sup>	6.054 <sup>49</sup>		45.84 <sup>160</sup>
31.1	15.967 <sup>12</sup>		45.52 <sup>49</sup>	3.580 <sup>15</sup>		15.83 <sup>55</sup>	18.805 <sup>40</sup>		90.71 <sup>301</sup>	6.005 <sup>9</sup>		44.24 <sup>185</sup>
Apr. 10.0	15.979		46.01	3.595		15.28 <sup>35</sup>	18.765		87.70	5.996		42.39
20.0	16.034 <sup>55</sup>		46.73 <sup>72</sup>	3.657 <sup>62</sup>		14.93 <sup>11</sup>	18.780 <sup>73</sup>		84.52 <sup>318</sup>	6.030 <sup>34</sup>		40.30 <sup>209</sup>
30.0	16.134 <sup>100</sup>		47.68 <sup>95</sup>	3.767 <sup>110</sup>		14.82 <sup>16</sup>	18.853 <sup>131</sup>		81.21 <sup>331</sup>	6.110 <sup>80</sup>		38.02 <sup>228</sup>
May 9.9	16.277 <sup>143</sup>		48.87 <sup>119</sup>	3.924 <sup>157</sup>		14.98 <sup>42</sup>	18.984 <sup>188</sup>		77.85 <sup>336</sup>	6.236 <sup>126</sup>		35.59 <sup>243</sup>
19.9	16.461 <sup>184</sup>		50.25 <sup>138</sup>	4.126 <sup>202</sup>		15.40 <sup>71</sup>	19.172 <sup>239</sup>		74.51 <sup>334</sup>	6.407 <sup>171</sup>		33.06 <sup>253</sup>
	224		158	241					324	211		259
29.9	16.685		51.83	4.367		16.11 <sup>96</sup>	19.411 <sup>286</sup>		71.27 <sup>305</sup>	6.618 <sup>248</sup>		30.47 <sup>256</sup>
June 8.9	16.941 <sup>256</sup>		53.55 <sup>172</sup>	4.642 <sup>275</sup>		17.07 <sup>120</sup>	19.697 <sup>325</sup>		68.22 <sup>281</sup>	6.866 <sup>276</sup>		27.91 <sup>250</sup>
18.8	17.222 <sup>281</sup>		55.38 <sup>183</sup>	4.944 <sup>302</sup>		18.27 <sup>141</sup>	20.022 <sup>356</sup>		65.41 <sup>248</sup>	7.142 <sup>300</sup>		25.41 <sup>236</sup>
28.8	17.522 <sup>311</sup>		57.27 <sup>191</sup>	5.265 <sup>331</sup>		19.68 <sup>159</sup>	20.378 <sup>377</sup>		62.93 <sup>209</sup>	7.442 <sup>314</sup>		23.05 <sup>215</sup>
July 8.8	17.833 <sup>314</sup>		59.18 <sup>186</sup>	5.596 <sup>333</sup>		21.27 <sup>170</sup>	20.755 <sup>389</sup>		60.84 <sup>165</sup>	7.756 <sup>320</sup>		20.90 <sup>190</sup>
18.8	18.147 <sup>310</sup>		61.04 <sup>177</sup>	5.929 <sup>329</sup>		22.97 <sup>178</sup>	21.144 <sup>389</sup>		59.19 <sup>116</sup>	8.076 <sup>320</sup>		19.00 <sup>158</sup>
28.7	18.457 <sup>297</sup>		62.81 <sup>162</sup>	6.258 <sup>316</sup>		24.75 <sup>182</sup>	21.533 <sup>380</sup>		58.03 <sup>63</sup>	8.396 <sup>307</sup>		17.42 <sup>122</sup>
Aug. 7.7	18.754 <sup>280</sup>		64.43 <sup>145</sup>	6.574 <sup>297</sup>		26.57 <sup>181</sup>	21.913 <sup>360</sup>		57.40 <sup>10</sup>	8.703 <sup>293</sup>		16.20 <sup>84</sup>
17.7	19.034 <sup>257</sup>		65.88 <sup>123</sup>	6.871 <sup>274</sup>		28.38 <sup>176</sup>	22.273 <sup>332</sup>		57.30 <sup>46</sup>	8.996 <sup>271</sup>		15.36 <sup>42</sup>
27.6	19.291 <sup>232</sup>		67.11 <sup>100</sup>	7.145 <sup>246</sup>		30.14 <sup>165</sup>	22.605 <sup>295</sup>		57.76 <sup>98</sup>	9.267 <sup>243</sup>		14.94 <sup>2</sup>
Sept. 6.6	19.523		68.11 <sup>74</sup>	7.391		31.79 <sup>155</sup>	22.900		58.74	9.510		14.92
16.6	19.724 <sup>201</sup>		68.85 <sup>49</sup>	7.606 <sup>215</sup>		33.34 <sup>140</sup>	23.152 <sup>252</sup>		60.21 <sup>147</sup>	9.722 <sup>212</sup>		15.32 <sup>40</sup>
26.6	19.894 <sup>170</sup>		69.34 <sup>23</sup>	7.791 <sup>185</sup>		34.74 <sup>123</sup>	23.356 <sup>204</sup>		62.10 <sup>189</sup>	9.899 <sup>177</sup>		16.10 <sup>78</sup>
Oct. 6.5	20.033 <sup>139</sup>		69.57 <sup>1</sup>	7.942 <sup>151</sup>		35.97 <sup>106</sup>	23.509 <sup>153</sup>		64.36 <sup>226</sup>	10.042 <sup>143</sup>		17.22 <sup>112</sup>
16.5	20.140 <sup>107</sup>		69.58 <sup>20</sup>	8.060 <sup>118</sup>		37.03 <sup>88</sup>	23.609 <sup>100</sup>		66.89 <sup>253</sup>	10.042 <sup>107</sup>		17.22 <sup>139</sup>
	76			87			48		270	71		160
26.5	20.216		69.38	8.147		37.91 <sup>69</sup>	23.657		69.59	10.220		20.21
Nov. 5.5	20.264 <sup>48</sup>		69.00 <sup>38</sup>	8.203 <sup>56</sup>		38.60 <sup>52</sup>	23.652		72.35 <sup>276</sup>	10.257		21.96 <sup>175</sup>
15.4	20.282 <sup>18</sup>		68.49 <sup>51</sup>	8.229 <sup>26</sup>		39.12 <sup>35</sup>	23.601		75.06 <sup>271</sup>	10.263		23.78 <sup>182</sup>
25.4	20.274 <sup>8</sup>		67.87 <sup>62</sup>	8.226 <sup>3</sup>		39.47 <sup>16</sup>	23.506		77.61 <sup>255</sup>	10.237		25.58 <sup>180</sup>
Dec. 5.4	20.239 <sup>35</sup>		67.18 <sup>69</sup>	8.194 <sup>32</sup>		39.63 <sup>1</sup>	23.370		79.92 <sup>231</sup>	10.183		27.30 <sup>172</sup>
	57		74	58			171		196	81		156
15.3	20.182		66.44	8.136		39.62	23.199		81.88	10.102		28.86
25.3	20.101 <sup>81</sup>		65.69 <sup>75</sup>	8.053 <sup>83</sup>		39.44 <sup>18</sup>	22.999 <sup>200</sup>		83.43 <sup>155</sup>	10.000 <sup>102</sup>		30.22 <sup>136</sup>
35.3	20.003 <sup>98</sup>		64.95 <sup>74</sup>	7.948 <sup>105</sup>		39.10 <sup>34</sup>	22.778 <sup>221</sup>		84.53 <sup>110</sup>	9.877 <sup>123</sup>		31.33 <sup>111</sup>
Mean Place	15.422		41.75	3.057		10.04	19.001		92.87	5.618		46.13
Sec $\delta$ , Tan $\delta$	1.001		+0.049	1.067		+0.372	1.458		-1.062	1.075		-0.393
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06		0.00	+0.07		-0.02	+0.05		+0.06	+0.06		+0.02
D $\psi$ $\delta$ , D $\omega$ $\delta$	+0.4		+0.5	+0.4		+0.5	+0.4		+0.5	+0.3		+0.5





**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Fornacis. Mag. 5.2		$\gamma$ Trianguli. Mag. 4.1		$\delta$ Ceti. Mag. 5.7		$\phi$ Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 9	° ' -31 6	h m 2 12	° ' +33 27	h m 2 12	° ' - 6 47	h m 2 13	° ' -51 53
	s	"	s	"	s	"	s	"
Jan. 0.3	16.491	50.96 103	24.214	66.32 0	52.088	71.66 88	34.352	54.43 101
10.3	16.338 153	51.99 64	24.087 127	66.32 0	51.983 105	72.54 88	34.086 266	55.44 101
20.3	16.169 169	52.63 24	23.940 147	66.04 28	51.861 122	73.25 71	33.803 283	55.90 46
30.2	15.992 177	52.87 —	23.776 164	65.50 54	51.728 133	73.80 55	33.510 293	55.83 7
Feb. 9.2	15.811 181	52.70 17	23.606 170	64.71 79	51.589 139	74.15 35	33.218 292	55.22 61
	176	58	166	100	137	14	283	113
19.2	15.635	52.12 96	23.440	63.71 118	51.452	74.29 6	32.935	54.09 161
Mar. 1.2	15.473 162	51.16 134	23.285 155	62.53 128	51.324 128	74.23 30	32.673 262	52.48 205
11.1	15.331 142	49.82 168	23.155 130	61.25 134	51.215 109	73.93 52	32.440 233	50.43 246
21.1	15.219 112	48.14 201	23.055 100	59.91 134	51.129 86	73.41 77	32.247 193	47.97 278
31.1	15.142 77	46.13 228	22.998 57	58.57 125	51.076 53	72.64 100	32.101 146	45.19 307
	35		10		15		91	
Apr. 10.0	15.107	43.85 252	22.988	57.32 111	51.061	71.64 124	32.010 33	42.12 327
20.0	15.116 9	41.33 271	23.030 42	56.21 93	51.088 27	70.40 146	31.977 30	38.85 342
30.0	15.175 59	38.62 283	23.127 97	55.28 67	51.159 71	68.94 167	32.007 96	35.43 348
May 10.0	15.283 108	35.79 291	23.276 149	54.61 41	51.275 116	67.27 183	32.103 158	31.95 347
19.9	15.440 157	32.88 292	23.478 202	54.20 10	51.434 159	65.44 196	32.261 218	28.48 339
	201		247		199		218	
29.9	15.641	29.96 285	23.725	54.10 22	51.633	63.48 206	32.479 273	25.09 321
June 8.9	15.883 242	27.11 273	24.011 286	54.32 51	51.867 234	61.42 210	32.752 321	21.88 297
18.9	16.159 276	24.38 252	24.332 321	54.83 83	52.132 265	59.32 209	33.073 362	18.91 265
28.8	16.461 302	21.86 225	24.678 346	55.66 108	52.418 286	57.23 202	33.435 390	16.26 224
July 8.8	16.782 321	19.61 192	25.037 359	56.74 132	52.720 302	55.21 189	33.825 409	14.02 181
	332		366		309		409	
18.8	17.114	17.69 154	25.403	58.06 154	53.029	53.32 171	34.234 418	12.21 129
28.7	17.449 335	16.15 111	25.768 365	59.60 171	53.338 309	51.61 150	34.652 415	10.92 74
Aug. 7.7	17.777 328	15.04 65	26.122 354	61.31 181	53.639 301	50.11 122	35.067 401	10.18 18
17.7	18.090 313	14.39 17	26.460 338	63.12 191	53.927 288	48.89 93	35.468 374	10.00 40
27.7	18.383 293	14.22 30	26.777 317	65.03 193	54.196 269	47.96 61	35.842 340	10.40 96
	265		290		245		340	
Sept. 6.6	18.648	14.52 77	27.067	66.96 193	54.441	47.35 28	36.182 299	11.36 148
16.6	18.881 233	15.29 119	27.327 260	68.89 189	54.659 218	47.07 3	36.481 249	12.84 197
26.6	19.078 197	16.48 156	27.554 227	70.78 183	54.848 189	47.10 34	36.730 195	14.81 234
Oct. 6.6	19.238 160	18.04 187	27.747 193	72.61 172	55.006 158	47.44 60	36.925 137	17.15 268
16.5	19.358 120	19.91 211	27.906 159	74.33 159	55.132 126	48.04 82	37.062 77	19.83 288
	81		123		96			
26.5	19.439	22.02 224	28.029	75.92 145	55.228	48.86 99	37.139 21	22.71 296
Nov. 5.5	19.481 42	24.26 228	28.118 89	77.37 129	55.293 65	49.85 112	37.160 38	25.67 296
15.4	19.486 5	26.54 225	28.170 52	78.66 109	55.327 34	50.97 120	37.122 91	28.63 282
25.4	19.455 31	28.79 210	28.188 18	79.75 89	55.333 6	52.17 120	37.031 139	31.45 257
Dec. 5.4	19.391 64	30.89 190	28.170 18	80.64 64	55.310 23	53.37 116	36.892 185	34.02 224
	93		51		48			
15.4	19.298	32.79 161	28.119	81.28 41	55.262	54.53 109	36.707 223	36.26 181
25.3	19.177 121	34.40 128	28.036 83	81.69 14	55.188 74	55.62 98	36.484 253	38.07 135
35.3	19.033 144		27.922 114		55.092 96		36.231	
Mean Place	14.907	47.04	22.490	50.23	50.533	75.03	32.555	45.88
Sec $\delta$ , Tan $\delta$	1.168	-0.604	1.199	+0.661	1.007	-0.119	1.620	-1.275
$D_{\mu} a$ , $D_{\mu} \alpha$	+0.05	+0.03	+0.07	-0.04	+0.06	+0.01	+0.04	+0.07
$D_{\mu} \delta$ , $D_{\mu} \delta$	+0.3	+0.5	+0.3	+0.5	+0.3	+0.5	+0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Ceti. (Mira.) Var. 1.7-9.6		♋ Fornacis. Mag. 5.4		♊ Hydri. Mag. 4.3		♑ Cassiopeiæ. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 15 s	° ' " - 3 20 "	h m 2 18 s	° ' " -24 11 "	h m 2 20 s	° ' " -69 1 "	h m 2 22 s	° ' " +67 1 "
Jan. 0.3	10.717	69.37	46.250	37.21	18.41	83.20	15.31	71.72
10.3	10.616 <sup>101</sup>	70.20 <sup>83</sup>	46.119 <sup>131</sup>	38.29 <sup>108</sup>	17.86 <sup>55</sup>	84.09 <sup>89</sup>	14.94 <sup>37</sup>	72.79 <sup>107</sup>
20.3	10.496 <sup>120</sup>	70.91 <sup>71</sup>	45.971 <sup>148</sup>	39.05 <sup>76</sup>	17.29 <sup>57</sup>	84.37 <sup>28</sup>	14.53 <sup>41</sup>	73.34 <sup>55</sup>
30.2	10.366 <sup>130</sup>	71.49 <sup>58</sup>	45.811 <sup>160</sup>	39.46 <sup>41</sup>	16.70 <sup>59</sup>	84.06 <sup>31</sup>	14.09 <sup>44</sup>	73.33 <sup>1</sup>
Feb. 9.2	10.229 <sup>137</sup>	71.90 <sup>41</sup>	45.646 <sup>164</sup>	39.51 <sup>5</sup>	16.12 <sup>58</sup>	83.15 <sup>91</sup>	13.64 <sup>45</sup>	72.79 <sup>54</sup>
	136	24	162	30	56	146	44	107
19.2	10.093	72.14	45.484	39.21	15.56	81.69	13.20	71.72
Mar. 1.2	9.966 <sup>127</sup>	72.21 <sup>7</sup>	45.331 <sup>153</sup>	38.54 <sup>67</sup>	15.04 <sup>52</sup>	79.72 <sup>197</sup>	12.79 <sup>41</sup>	70.18 <sup>154</sup>
11.1	9.856 <sup>110</sup>	72.06 <sup>15</sup>	45.197 <sup>134</sup>	37.54 <sup>100</sup>	14.58 <sup>46</sup>	77.29 <sup>243</sup>	12.44 <sup>35</sup>	68.24 <sup>194</sup>
21.1	9.772 <sup>84</sup>	71.71 <sup>35</sup>	45.088 <sup>109</sup>	36.21 <sup>133</sup>	14.17 <sup>41</sup>	74.48 <sup>281</sup>	12.17 <sup>27</sup>	65.99 <sup>225</sup>
31.1	9.719 <sup>53</sup>	71.14 <sup>57</sup>	45.013 <sup>75</sup>	34.57 <sup>164</sup>	13.85 <sup>32</sup>	71.32 <sup>316</sup>	11.97 <sup>20</sup>	63.51 <sup>248</sup>
	16	81	36	191	24	340	9	261
Apr. 10.0	9.703	70.33	44.977	32.66	13.61	67.92	11.88	60.90
20.0	9.729 <sup>26</sup>	69.31 <sup>102</sup>	44.984 <sup>7</sup>	30.50 <sup>216</sup>	13.47 <sup>14</sup>	64.32 <sup>360</sup>	11.89 <sup>1</sup>	58.29 <sup>261</sup>
30.0	9.800 <sup>71</sup>	68.05 <sup>126</sup>	45.037 <sup>53</sup>	28.13 <sup>237</sup>	13.44 <sup>3</sup>	60.63 <sup>369</sup>	12.02 <sup>13</sup>	55.76 <sup>253</sup>
May 10.0	9.915 <sup>115</sup>	66.59 <sup>146</sup>	45.138 <sup>101</sup>	25.60 <sup>253</sup>	13.51 <sup>7</sup>	56.92 <sup>371</sup>	12.25 <sup>23</sup>	53.41 <sup>235</sup>
19.9	10.073 <sup>158</sup>	64.94 <sup>165</sup>	45.285 <sup>147</sup>	22.97 <sup>263</sup>	13.68 <sup>17</sup>	53.27 <sup>365</sup>	12.59 <sup>34</sup>	51.32 <sup>209</sup>
	199	178	190	269	27	350	43	175
29.9	10.272	63.16	45.475	20.28	13.95	49.77	13.02	49.57
June 8.9	10.505 <sup>233</sup>	61.25 <sup>191</sup>	45.704 <sup>229</sup>	17.61 <sup>267</sup>	14.31 <sup>36</sup>	46.49 <sup>328</sup>	13.53 <sup>51</sup>	48.19 <sup>138</sup>
18.9	10.769 <sup>264</sup>	59.27 <sup>198</sup>	45.968 <sup>264</sup>	15.02 <sup>259</sup>	14.75 <sup>44</sup>	43.52 <sup>297</sup>	14.11 <sup>58</sup>	47.25 <sup>94</sup>
28.8	11.054 <sup>285</sup>	57.28 <sup>199</sup>	46.257 <sup>289</sup>	12.56 <sup>246</sup>	15.28 <sup>53</sup>	40.94 <sup>258</sup>	14.74 <sup>63</sup>	46.76 <sup>49</sup>
July 8.8	11.356 <sup>302</sup>	55.33 <sup>195</sup>	46.566 <sup>309</sup>	10.32 <sup>224</sup>	15.85 <sup>57</sup>	38.80 <sup>214</sup>	15.41 <sup>67</sup>	46.74 <sup>2</sup>
	308	187	319	197	62	163	68	44
18.8	11.664	53.46	46.885	8.35	16.47	37.17	16.09	47.18
28.7	11.973 <sup>309</sup>	51.74 <sup>172</sup>	47.206 <sup>321</sup>	6.70 <sup>165</sup>	17.10 <sup>63</sup>	36.10 <sup>107</sup>	16.78 <sup>69</sup>	48.07 <sup>89</sup>
Aug. 7.7	12.274 <sup>301</sup>	50.22 <sup>152</sup>	47.522 <sup>316</sup>	5.42 <sup>128</sup>	17.75 <sup>65</sup>	35.63 <sup>47</sup>	17.46 <sup>68</sup>	49.38 <sup>131</sup>
17.7	12.563 <sup>289</sup>	48.93 <sup>129</sup>	47.826 <sup>304</sup>	4.56 <sup>86</sup>	18.38 <sup>63</sup>	35.76 <sup>13</sup>	18.12 <sup>66</sup>	51.09 <sup>171</sup>
27.7	12.833 <sup>270</sup>	47.90 <sup>103</sup>	48.111 <sup>285</sup>	4.12 <sup>44</sup>	18.97 <sup>59</sup>	36.47 <sup>71</sup>	18.74 <sup>62</sup>	53.16 <sup>207</sup>
	246	73	261	1	55	132	57	237
Sept. 6.6	13.079	47.17	48.372	4.13	19.52	37.79	19.31	55.53
16.6	13.300 <sup>221</sup>	46.72 <sup>45</sup>	48.604 <sup>232</sup>	4.58 <sup>45</sup>	19.99 <sup>47</sup>	39.64 <sup>185</sup>	19.83 <sup>52</sup>	58.18 <sup>265</sup>
26.6	13.490 <sup>190</sup>	46.59 <sup>13</sup>	48.804 <sup>200</sup>	5.44 <sup>86</sup>	20.38 <sup>39</sup>	41.98 <sup>234</sup>	20.29 <sup>46</sup>	61.02 <sup>284</sup>
Oct. 6.6	13.651 <sup>161</sup>	46.74 <sup>15</sup>	48.969 <sup>165</sup>	6.66 <sup>122</sup>	20.68 <sup>30</sup>	44.72 <sup>274</sup>	20.68 <sup>39</sup>	64.04 <sup>302</sup>
16.5	13.782 <sup>131</sup>	47.14 <sup>40</sup>	49.099 <sup>130</sup>	8.21 <sup>155</sup>	20.88 <sup>20</sup>	47.75 <sup>303</sup>	21.00 <sup>32</sup>	67.14 <sup>310</sup>
	98	63	94	177	9	321	24	313
26.5	13.880	47.77	49.193	9.98	20.97	50.96	21.24	70.27
Nov. 5.5	13.948 <sup>68</sup>	48.58 <sup>81</sup>	49.252 <sup>59</sup>	11.93 <sup>195</sup>	20.94 <sup>3</sup>	54.23 <sup>327</sup>	21.39 <sup>15</sup>	73.35 <sup>308</sup>
15.4	13.988 <sup>40</sup>	49.51 <sup>93</sup>	49.276 <sup>24</sup>	13.96 <sup>203</sup>	20.82 <sup>12</sup>	57.43 <sup>320</sup>	21.47 <sup>8</sup>	76.35 <sup>300</sup>
25.4	13.997 <sup>9</sup>	50.53 <sup>102</sup>	49.267 <sup>9</sup>	15.98 <sup>202</sup>	20.59 <sup>23</sup>	60.44 <sup>301</sup>	21.46 <sup>1</sup>	79.17 <sup>282</sup>
Dec. 5.4	13.979 <sup>18</sup>	51.58 <sup>105</sup>	49.227 <sup>40</sup>	17.92 <sup>194</sup>	20.27 <sup>32</sup>	63.14 <sup>270</sup>	21.36 <sup>10</sup>	81.71 <sup>254</sup>
	44	105	71	180	40	230	18	222
15.4	13.935	52.63	49.156	19.72	19.87	65.44	21.18	83.93
25.3	13.865 <sup>70</sup>	53.63 <sup>100</sup>	49.059 <sup>97</sup>	21.28 <sup>156</sup>	19.39 <sup>48</sup>	67.26 <sup>182</sup>	20.92 <sup>26</sup>	85.76 <sup>183</sup>
35.3	13.772 <sup>93</sup>	54.54 <sup>91</sup>	48.937 <sup>122</sup>	22.56 <sup>128</sup>	18.87 <sup>52</sup>	68.53 <sup>127</sup>	20.58 <sup>34</sup>	87.12 <sup>136</sup>
Mean Place	9.150	73.83	44.646	35.30	14.017	72.48	12.509	48.50
Sec δ, Tan δ	1.002	-0.058	1.096	-0.449	2.795	-2.610	2.563	+2.360
D <sub>+</sub> α, D <sub>ω</sub> α	+0.06	0.00	+0.05	+0.02	+0.02	+0.14	+0.10	-0.13
D <sub>+</sub> δ, D <sub>ω</sub> δ	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.8



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Hydri. Mag. 5.3		ν Arietis. Mag. 5.4		δ Ceti. Mag. 4.0		ε Hydri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 33 s	° ' " -79 27 "	h m 2 34 s	° ' " +21 36 "	h m 2 35 s	° ' " - 0 1 "	h m 2 38 s	° ' " -68 36 "
Jan. 0.3	27.66	89.07 89	7.785	23.37 25	15.287	38.35 81	21.00	90.86 116
10.3	26.49 117	89.96 29	7.686 99	23.12 38	15.193 94	39.16 71	20.48 52	92.02 56
20.3	25.24 125	90.25 32	7.564 122	22.74 51	15.078 115	39.87 61	19.92 56	92.58 4
30.2	23.98 126	89.93 91	7.425 139	22.23 62	14.948 130	40.48 49	19.33 58	92.54 62
Feb. 9.2	22.74 124	89.02 147	7.275 150	21.61 72	14.808 140	40.97 35	18.75 57	91.92 119
19.2	21.53 113	87.55 199	7.122 146	20.89 78	14.666 137	41.32 18	18.18 54	90.73 172
Mar. 1.2	20.40 104	85.56 243	6.976 128	20.11 81	14.529 122	41.50 2	17.64 50	89.01 220
11.1	19.36 92	83.13 282	6.848 104	19.30 78	14.407 100	41.52 17	17.14 44	86.81 263
21.1	18.44 75	80.31 317	6.744 69	18.52 71	14.307 69	41.35 37	16.70 36	84.18 298
31.1	17.69 60	77.14 340	6.675 28	17.81 61	14.238 33	40.98 58	16.34 28	81.20 327
Apr. 10.1	17.09 43	73.74 358	6.647 17	17.20 46	14.205 9	40.40 81	16.06 18	77.93 349
20.0	16.66 22	70.16 368	6.664 65	16.74 26	14.214 53	39.59 102	15.88 8	74.44 363
30.0	16.44 3	66.48 369	6.729 115	16.48 6	14.267 98	38.57 124	15.80 2	70.81 368
May 10.0	16.41 16	62.79 363	6.844 163	16.42 19	14.365 143	37.33 142	15.82 11	67.13 367
19.9	16.57 36	59.16 347	7.007 207	16.61 43	14.508 183	35.91 160	15.93 23	63.46 355
29.9	16.93 53	55.69 325	7.214 246	17.04 67	14.691 221	34.31 172	16.16 32	59.91 338
June 8.9	17.46 71	52.44 294	7.460 278	17.71 89	14.912 253	32.59 182	16.48 40	56.53 308
18.9	18.17 86	49.50 255	7.738 304	18.60 111	15.165 277	30.77 187	16.88 48	53.45 274
28.8	19.03 98	46.95 210	8.042 323	19.71 127	15.442 295	28.90 196	17.36 54	50.71 232
July 8.8	20.01 107	44.85 159	8.365 331	20.98 141	15.737 306	27.04 181	17.90 58	48.39 182
18.8	21.08 114	43.26 104	8.696 333	22.39 151	16.043 309	25.23 169	18.48 62	46.57 129
28.8	22.22 117	42.22 43	9.029 329	23.90 156	16.352 303	23.54 154	19.10 63	45.28 71
Aug. 7.7	23.39 116	41.79 16	9.358 317	25.46 157	16.655 295	22.00 134	19.73 63	44.57 10
17.7	24.55 112	41.95 77	9.675 299	27.03 154	16.950 279	20.66 110	20.36 60	44.47 53
27.7	25.67 103	42.72 136	9.974 278	28.57 148	17.229 257	19.56 85	20.96 56	45.00 112
Sept. 6.6	26.70 91	44.08 191	10.252 253	30.05 139	17.486 235	18.71 56	21.52 50	46.12 169
16.6	27.61 76	45.99 238	10.505 227	31.44 126	17.721 207	18.15 27	22.02 42	47.81 219
26.6	28.37 59	48.37 278	10.732 196	32.70 114	17.928 181	17.88 1	22.44 34	50.00 264
Oct. 6.6	28.96 38	51.15 309	10.928 167	33.84 99	18.109 150	17.87 24	22.78 23	52.64 296
16.5	29.34 17	54.24 325	11.095 137	34.83 83	18.259 120	18.11 46	23.01 14	55.60 319
26.5	29.51 6	57.49 331	11.232 104	35.66 68	18.379 92	18.57 65	23.15 3	58.79 331
Nov. 5.5	29.45 28	60.80 325	11.336 74	36.34 54	18.471 61	19.22 78	23.18 7	62.10 328
15.5	29.17 49	64.05 305	11.410 40	36.88 40	18.532 31	20.00 88	23.11 18	65.38 313
25.4	28.68 68	67.10 274	11.450 10	37.28 25	18.563 2	20.88 94	22.93 29	68.51 288
Dec. 5.4	28.00 86	69.84 233	11.460 23	37.53 11	18.565 28	21.82 95	22.64 36	71.39 250
15.4	27.14 102	72.17 183	11.437 55	37.64 3	18.537 55	22.77 92	22.28 43	73.89 206
25.3	26.12 111	74.00 129	11.382 84	37.61 19	18.482 82	23.69 87	21.85 50	75.94 152
35.3	25.01	75.29	11.298	37.42	18.400	24.56	21.35	77.46
Mean Place	23.719	78.11	6.008	11.29	13.607	43.75	18.462	80.74
Sec δ, Tan δ	5.470	-5.379	1.076	+0.396	1.000	0.000	2.744	-2.555
Dψ α, Dω α	-0.03	+0.28	+0.07	-0.02	+0.06	0.00	+0.02	+0.13
Dψ δ, Dω δ	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Persei. Mag. 4.2			$\gamma$ Ceti seq. Mag. 3.7			$\pi$ Ceti. Mag. 4.4			$\mu$ Ceti. Mag. 4.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	2	38	+48 52	2	38	+ 2 53	2	40	-14 12	2	40	+ 9 45
	s		"	s		"	s		"	s		"
Jan. 0.3	33.574		60.90	61.581		18.20	11.960		33.41	28.894		60.45
10.3	33.410	164	61.56	61.490	91	17.46	11.855	105	34.51	28.806	88	59.88
20.3	33.213	197	61.82	61.377	113	16.78	11.727	128	35.38	28.694	112	59.30
30.3	32.989	224	61.69	61.247	130	16.17	11.584	143	35.99	28.565	129	58.72
Feb. 9.2	32.752	237	61.16	61.108	139	15.65	11.432	152	36.33	28.424	141	58.16
		239			143			155			144	
19.2	32.513		60.26	60.965		15.23	11.277		36.40	28.280		57.64
Mar. 1.2	32.285	228	59.02	60.827	138	14.97	11.127	150	36.17	28.141	139	57.17
11.1	32.083	202	57.50	60.703	124	14.83	10.990	137	35.67	28.017	124	56.79
21.1	31.920	163	55.77	60.601	102	14.86	10.877	113	34.87	27.914	103	56.53
31.1	31.805	115	53.90	60.529	72	15.08	10.794	83	33.80	27.843	71	56.40
		57			35			48			34	
Apr. 10.1	31.748		51.98	60.494		15.49	10.746		32.47	27.809		56.43
20.0	31.758	10	50.09	60.500	6	16.12	10.740	6	30.89	27.817	8	56.66
30.0	31.833	75	48.31	60.550	50	16.96	10.778	38	29.09	27.871	54	57.09
May 10.0	31.977	144	46.71	60.646	96	18.01	10.862	84	27.09	27.972	101	57.74
20.0	32.186	209	45.35	60.786	140	19.25	10.992	130	24.92	28.118	146	58.59
		269			183			172			187	
29.9	32.455		44.29	60.969		20.68	11.164		22.66	28.305		59.64
June 8.9	32.777	322	43.56	61.189	220	22.25	11.375	211	20.33	28.531	226	60.89
18.9	33.145	368	43.18	61.441	252	23.95	11.620	245	18.00	28.789	258	62.28
28.8	33.547	402	43.16	61.718	277	25.70	11.891	271	15.72	29.072	283	63.79
July 8.8	33.973	426	43.50	62.013	295	27.48	12.182	291	13.56	29.375	303	65.38
		440			307			305			312	
18.8	34.413		44.20	62.320		29.22	12.487		11.58	29.687		67.00
28.8	34.859	446	45.23	62.629	309	30.89	12.795	308	9.84	30.002	315	68.60
Aug. 7.7	35.300	441	46.55	62.934	305	32.43	13.101	306	8.37	30.314	312	70.15
17.7	35.728	428	48.14	63.230	296	33.80	13.399	298	7.24	30.615	301	71.59
27.7	36.134	406	49.95	63.511	281	34.95	13.682	283	6.47	30.902	287	72.89
		381			260			262			267	
Sept. 6.7	36.515		51.95	63.771		35.88	13.944		6.08	31.169		74.01
16.6	36.864	349	54.10	64.009	238	36.55	14.183	239	6.07	31.413	244	74.94
26.6	37.177	313	56.35	64.220	211	36.95	14.394	211	6.44	31.631	218	75.65
Oct. 6.6	37.453	276	58.66	64.405	185	37.10	14.576	182	7.16	31.822	191	76.16
16.5	37.687	234	60.99	64.560	155	37.02	14.727	151	8.18	31.984	162	76.45
		190			125			119			133	
26.5	37.877		63.30	64.685		36.70	14.846		9.47	32.117		76.56
Nov. 5.5	38.021	144	65.54	64.782	97	36.22	14.934	88	10.94	32.220	103	76.50
15.5	38.118	97	67.66	64.848	66	35.60	14.989	55	12.54	32.293	73	76.30
25.4	38.167	49	69.63	64.884	36	34.86	15.012	23	14.20	32.336	43	75.98
Dec. 5.4	38.165	2	71.40	64.891	7	34.07	15.005	7	15.83	32.348	12	75.56
		50			24			38			18	
15.4	38.115		72.91	64.867		33.24	14.967		17.40	32.330		75.07
25.4	38.017	98	74.11	64.815	52	32.41	14.900	67	18.84	32.283	47	74.53
35.3	37.875	142	74.97	64.736	79	31.61	14.806	94	20.09	32.206	77	73.96
Mean Place	31.361		41.76	59.876		11.96	10.269		34.51	27.153		52.09
Sec $\delta$ , Tan $\delta$	1.520		+1.146	1.001		+0.050	1.031		-0.253	1.015		+0.172
$D_{\psi} \alpha$ , $D_{\alpha} \alpha$	+0.08		-0.06	+0.06		0.00	+0.06		+0.01	+0.06		-0.01
$D_{\psi} \delta$ , $D_{\delta} \delta$	+0.3		+0.6	+0.3		+0.6	+0.3		+0.6	+0.3		+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Persei. Mag. 3.9			41 Arietis. Mag. 3.7			β Fornacis. Mag. 4.5			σ Arietis. Mag. 5.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	2	44	+55 33	2	45	+26 55	2	45	-32 44	2	46	+14 44
	s		"	s		"	s		"	s		"
Jan. 0.3	40.440		27.33	7.526		22.46	38.788		78.37	56.230		36.03
10.3	40.242 <sup>198</sup>		28.27 <sup>94</sup>	7.428 <sup>98</sup>		22.43 <sup>3</sup>	38.640 <sup>148</sup>		79.75 <sup>138</sup>	56.144 <sup>88</sup>		35.61 <sup>42</sup>
20.3	40.001 <sup>241</sup>		28.76 <sup>49</sup>	7.303 <sup>125</sup>		22.20 <sup>23</sup>	38.469 <sup>171</sup>		80.72 <sup>97</sup>	56.032 <sup>112</sup>		35.13 <sup>48</sup>
30.3	39.729 <sup>272</sup>		28.81 <sup>5</sup>	7.157 <sup>146</sup>		21.79 <sup>41</sup>	38.282 <sup>187</sup>		81.27 <sup>55</sup>	55.901 <sup>131</sup>		34.60 <sup>53</sup>
Feb. 9.2	39.440 <sup>289</sup>		28.41 <sup>40</sup>	6.997 <sup>160</sup>		21.22 <sup>57</sup>	38.085 <sup>197</sup>		81.38 <sup>11</sup>	55.757 <sup>144</sup>		34.04 <sup>56</sup>
		291	83		164	73		199	31		149	58
19.2	39.149		27.58	6.833		20.49	37.886		81.07	55.608		33.46
Mar. 1.2	38.870 <sup>279</sup>		26.33 <sup>125</sup>	6.675 <sup>158</sup>		19.64 <sup>85</sup>	37.693 <sup>193</sup>		80.33 <sup>74</sup>	55.464 <sup>144</sup>		32.89 <sup>57</sup>
11.1	38.621 <sup>249</sup>		24.75 <sup>158</sup>	6.532 <sup>143</sup>		18.71 <sup>93</sup>	37.516 <sup>177</sup>		79.19 <sup>114</sup>	55.333 <sup>131</sup>		32.35 <sup>54</sup>
21.1	38.415 <sup>206</sup>		22.91 <sup>184</sup>	6.415 <sup>117</sup>		17.75 <sup>96</sup>	37.365 <sup>151</sup>		77.66 <sup>153</sup>	55.225 <sup>108</sup>		31.88 <sup>47</sup>
31.1	38.265 <sup>150</sup>		20.86 <sup>205</sup>	6.333 <sup>82</sup>		16.80 <sup>95</sup>	37.246 <sup>119</sup>		75.79 <sup>187</sup>	55.147 <sup>78</sup>		31.51 <sup>37</sup>
		82	216		41	88		80	219		40	23
Apr. 10.1	38.183		18.70	6.292		15.92	37.166		73.60	55.107		31.28
20.0	38.174 <sup>9</sup>		16.53 <sup>217</sup>	6.299 <sup>7</sup>		15.16 <sup>76</sup>	37.133 <sup>33</sup>		71.15 <sup>245</sup>	55.110 <sup>3</sup>		31.21 <sup>7</sup>
30.0	38.242 <sup>68</sup>		14.45 <sup>208</sup>	6.356 <sup>57</sup>		14.56 <sup>60</sup>	37.147 <sup>14</sup>		68.47 <sup>268</sup>	55.160 <sup>50</sup>		31.32 <sup>11</sup>
May 10.0	38.390 <sup>148</sup>		12.50 <sup>195</sup>	6.464 <sup>108</sup>		14.16 <sup>40</sup>	37.211 <sup>64</sup>		65.62 <sup>285</sup>	55.257 <sup>97</sup>		31.65 <sup>33</sup>
20.0	38.611 <sup>221</sup>		10.80 <sup>170</sup>	6.623 <sup>159</sup>		14.00 <sup>16</sup>	37.326 <sup>115</sup>		62.67 <sup>295</sup>	55.400 <sup>143</sup>		32.19 <sup>54</sup>
		293	144		205	7		164	299		186	76
29.9	38.904		9.36	6.828		14.07	37.490		59.68	55.586		32.95
June 8.9	39.257 <sup>353</sup>		8.27 <sup>109</sup>	7.074 <sup>246</sup>		14.41 <sup>34</sup>	37.698 <sup>208</sup>		56.71 <sup>297</sup>	55.812 <sup>226</sup>		33.91 <sup>96</sup>
18.9	39.664 <sup>407</sup>		7.55 <sup>72</sup>	7.356 <sup>282</sup>		14.98 <sup>57</sup>	37.945 <sup>247</sup>		53.85 <sup>286</sup>	56.071 <sup>259</sup>		35.05 <sup>114</sup>
28.8	40.112 <sup>448</sup>		7.21 <sup>34</sup>	7.666 <sup>310</sup>		15.80 <sup>82</sup>	38.225 <sup>280</sup>		51.17 <sup>268</sup>	56.356 <sup>285</sup>		36.34 <sup>129</sup>
July 8.8	40.591 <sup>479</sup>		7.26 <sup>5</sup>	7.995 <sup>329</sup>		16.82 <sup>102</sup>	38.531 <sup>306</sup>		48.72 <sup>245</sup>	56.662 <sup>306</sup>		37.75 <sup>141</sup>
		498	43		341	121		322	212		316	148
18.8	41.089		7.69	8.336		18.03	38.853		46.60	56.978		39.23
28.8	41.594 <sup>505</sup>		8.51 <sup>82</sup>	8.682 <sup>346</sup>		19.38 <sup>135</sup>	39.185 <sup>332</sup>		44.85 <sup>175</sup>	57.299 <sup>321</sup>		40.75 <sup>152</sup>
Aug. 7.7	42.096 <sup>502</sup>		9.68 <sup>117</sup>	9.024 <sup>342</sup>		20.83 <sup>145</sup>	39.518 <sup>333</sup>		43.54 <sup>131</sup>	57.617 <sup>318</sup>		42.26 <sup>151</sup>
17.7	42.584 <sup>488</sup>		11.16 <sup>148</sup>	9.356 <sup>332</sup>		22.35 <sup>152</sup>	39.844 <sup>326</sup>		42.69 <sup>85</sup>	57.926 <sup>309</sup>		43.71 <sup>145</sup>
27.7	43.051 <sup>467</sup>		12.93 <sup>177</sup>	9.672 <sup>316</sup>		23.90 <sup>155</sup>	40.154 <sup>310</sup>		42.33 <sup>36</sup>	58.221 <sup>295</sup>		45.08 <sup>137</sup>
		439	203		296	154		291	16		275	123
Sept. 6.7	43.490		14.96	9.968		25.44	40.445		42.49	58.496		46.31
16.6	43.894 <sup>404</sup>		17.18 <sup>222</sup>	10.240 <sup>272</sup>		26.94 <sup>150</sup>	40.708 <sup>263</sup>		43.14 <sup>65</sup>	58.749 <sup>253</sup>		47.40 <sup>108</sup>
26.6	44.258 <sup>364</sup>		19.55 <sup>237</sup>	10.485 <sup>245</sup>		28.36 <sup>142</sup>	40.940 <sup>232</sup>		44.26 <sup>112</sup>	58.977 <sup>228</sup>		48.32 <sup>92</sup>
Oct. 6.6	44.579 <sup>321</sup>		22.04 <sup>249</sup>	10.701 <sup>216</sup>		29.70 <sup>134</sup>	41.138 <sup>198</sup>		45.81 <sup>155</sup>	59.177 <sup>200</sup>		49.05 <sup>73</sup>
16.5	44.854 <sup>275</sup>		24.61 <sup>257</sup>	10.887 <sup>186</sup>		30.93 <sup>123</sup>	41.299 <sup>161</sup>		47.71 <sup>190</sup>	59.349 <sup>172</sup>		49.61 <sup>56</sup>
		222	259		154	110		122	219		143	39
26.5	45.076		27.20	11.041		32.03	41.421		49.90	59.492		50.00
Nov. 5.5	45.245 <sup>169</sup>		29.73 <sup>253</sup>	11.163 <sup>122</sup>		33.01 <sup>98</sup>	41.503 <sup>82</sup>		52.28 <sup>238</sup>	59.605 <sup>113</sup>		50.22 <sup>22</sup>
15.5	45.359 <sup>114</sup>		32.19 <sup>246</sup>	11.253 <sup>90</sup>		33.86 <sup>85</sup>	41.547 <sup>44</sup>		54.76 <sup>248</sup>	59.687 <sup>82</sup>		50.31 <sup>9</sup>
25.4	45.414 <sup>55</sup>		34.51 <sup>232</sup>	11.307 <sup>54</sup>		34.55 <sup>69</sup>	41.551 <sup>4</sup>		57.24 <sup>248</sup>	59.739 <sup>52</sup>		50.27 <sup>4</sup>
Dec. 5.4	45.409 <sup>5</sup>		36.62 <sup>211</sup>	11.327 <sup>20</sup>		35.11 <sup>56</sup>	41.517 <sup>34</sup>		59.63 <sup>239</sup>	59.758 <sup>19</sup>		50.12 <sup>15</sup>
		62	185		16	40		70	220		13	25
15.4	45.347		38.47	11.311		35.51	41.447		61.83	59.745		49.87
25.4	45.227 <sup>120</sup>		40.00 <sup>153</sup>	11.261 <sup>50</sup>		35.73 <sup>22</sup>	41.343 <sup>104</sup>		63.78 <sup>195</sup>	59.701 <sup>44</sup>		49.55 <sup>32</sup>
35.3	45.054 <sup>173</sup>		41.16 <sup>116</sup>	11.178 <sup>83</sup>		35.78 <sup>5</sup>	41.210 <sup>133</sup>		65.39 <sup>161</sup>	59.627 <sup>74</sup>		49.14 <sup>41</sup>
Mean Place	37.944		7.10	5.632		9.16	37.016		74.56	54.428		26.31
Sec δ, Tan δ	1.768		+1.458	1.122		+0.508	1.189		-0.643	1.034		+0.263
Dψ α, Dω α	+0.09		-0.07	+0.07		-0.03	+0.05		+0.03	+0.07		-0.01
Dψ δ, Dω δ	+0.3		+0.7	+0.3		+0.7	+0.3		+0.7	+0.3		+0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau^2$ Eridani. Mag. 4.8		$\tau$ Persei. Mag. 4.1		$\eta$ Eridani. Mag. 4.0		$\epsilon$ Arietis (mean). Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 47 s 2 47	° ' " -21 20 " 2 47	h m 2 48 s 2 48	° ' " +52 25 " 2 48	h m 2 52 s 2 52	° ' " - 9 13 " 2 52	h m 2 54 s 2 54	° ' " +21 0 " 2 54
Jan. 0.3	18.067	44.48	24.234	44.88	24.078	37.56	29.629	44.02
10.3	17.950 <sup>117</sup>	45.73 <sup>125</sup>	24.059 <sup>175</sup>	45.73 <sup>85</sup>	23.984 <sup>94</sup>	38.63 <sup>107</sup>	29.542 <sup>87</sup>	43.80 <sup>22</sup>
20.3	17.812 <sup>138</sup>	46.70 <sup>97</sup>	23.843 <sup>216</sup>	46.20 <sup>47</sup>	23.865 <sup>119</sup>	39.52 <sup>89</sup>	29.428 <sup>114</sup>	43.48 <sup>32</sup>
30.3	17.656 <sup>156</sup>	47.33 <sup>63</sup>	23.598 <sup>245</sup>	46.23 <sup>3</sup>	23.729 <sup>136</sup>	40.19 <sup>67</sup>	29.292 <sup>136</sup>	43.05 <sup>43</sup>
Feb. 9.2	17.489 <sup>167</sup>	47.62 <sup>29</sup>	23.334 <sup>264</sup>	45.83 <sup>40</sup>	23.581 <sup>148</sup>	40.65 <sup>46</sup>	29.142 <sup>150</sup>	42.51 <sup>54</sup>
	170	4	267	80	153	21	157	62
19.2	17.319	47.58	23.067	45.03	23.428	40.86	28.985	41.89
Mar. 1.2	17.155 <sup>164</sup>	47.18 <sup>40</sup>	22.811 <sup>256</sup>	43.85 <sup>118</sup>	23.278 <sup>150</sup>	40.83 <sup>3</sup>	28.831 <sup>154</sup>	41.21 <sup>68</sup>
11.2	17.004 <sup>151</sup>	46.44 <sup>74</sup>	22.580 <sup>231</sup>	42.36 <sup>149</sup>	23.139 <sup>139</sup>	40.55 <sup>28</sup>	28.691 <sup>140</sup>	40.49 <sup>72</sup>
21.1	16.875 <sup>129</sup>	45.38 <sup>106</sup>	22.388 <sup>192</sup>	40.60 <sup>176</sup>	23.022 <sup>117</sup>	40.03 <sup>52</sup>	28.574 <sup>117</sup>	39.80 <sup>60</sup>
31.1	16.776 <sup>99</sup>	44.02 <sup>136</sup>	22.248 <sup>140</sup>	38.67 <sup>193</sup>	22.932 <sup>90</sup>	39.24 <sup>79</sup>	28.487 <sup>87</sup>	39.15 <sup>65</sup>
	63	166	79	202	54	102	49	57
Apr. 10.1	16.713	42.36	22.169	36.65	22.878	38.22	28.438	38.58
20.0	16.693	40.44 <sup>192</sup>	22.159 <sup>10</sup>	34.62 <sup>203</sup>	22.865 <sup>13</sup>	36.94 <sup>128</sup>	28.435 <sup>3</sup>	38.15 <sup>43</sup>
30.0	16.718 <sup>25</sup>	38.29 <sup>215</sup>	22.221 <sup>62</sup>	32.66 <sup>196</sup>	22.895 <sup>30</sup>	35.45 <sup>149</sup>	28.480 <sup>45</sup>	37.90 <sup>25</sup>
May 10.0	16.790 <sup>72</sup>	35.95 <sup>234</sup>	22.357 <sup>136</sup>	30.86 <sup>180</sup>	22.970 <sup>75</sup>	33.74 <sup>171</sup>	28.575 <sup>95</sup>	37.83 <sup>7</sup>
20.0	16.908 <sup>118</sup>	33.47 <sup>248</sup>	22.562 <sup>205</sup>	29.29 <sup>157</sup>	23.091 <sup>121</sup>	31.87 <sup>187</sup>	28.717 <sup>142</sup>	37.98 <sup>15</sup>
	163	257	271	130	164	201	186	36
29.9	17.071	30.90	22.833	27.99	23.255	29.86	28.903	38.34
June 8.9	17.275 <sup>204</sup>	28.29 <sup>261</sup>	23.164 <sup>331</sup>	27.01 <sup>98</sup>	23.458 <sup>203</sup>	27.75 <sup>211</sup>	29.132 <sup>229</sup>	38.93 <sup>59</sup>
18.9	17.514 <sup>239</sup>	25.74 <sup>255</sup>	23.543 <sup>379</sup>	26.38 <sup>63</sup>	23.694 <sup>236</sup>	25.61 <sup>214</sup>	29.395 <sup>263</sup>	39.74 <sup>81</sup>
28.9	17.784 <sup>270</sup>	23.27 <sup>247</sup>	23.961 <sup>418</sup>	26.13 <sup>25</sup>	23.958 <sup>264</sup>	23.49 <sup>212</sup>	29.686 <sup>291</sup>	40.74 <sup>100</sup>
July 8.8	18.074 <sup>290</sup>	20.98 <sup>229</sup>	24.409 <sup>448</sup>	26.25 <sup>12</sup>	24.244 <sup>286</sup>	21.44 <sup>205</sup>	29.999 <sup>313</sup>	41.90 <sup>116</sup>
	307	206	466	47	299	193	325	120
18.8	18.381	18.92	24.875	26.72	24.543	19.51	30.324	43.19
28.8	18.694 <sup>313</sup>	17.15 <sup>177</sup>	25.348 <sup>473</sup>	27.56 <sup>84</sup>	24.848 <sup>305</sup>	17.78 <sup>173</sup>	30.655 <sup>331</sup>	44.57 <sup>138</sup>
Aug. 7.7	19.007 <sup>313</sup>	15.72 <sup>143</sup>	25.819 <sup>471</sup>	28.72 <sup>116</sup>	25.152 <sup>304</sup>	16.28 <sup>150</sup>	30.984 <sup>329</sup>	46.00 <sup>143</sup>
17.7	19.311 <sup>304</sup>	14.68 <sup>104</sup>	26.279 <sup>460</sup>	30.17 <sup>145</sup>	25.450 <sup>298</sup>	15.06 <sup>122</sup>	31.305 <sup>321</sup>	47.45 <sup>145</sup>
27.7	19.603 <sup>292</sup>	14.05 <sup>63</sup>	26.719 <sup>440</sup>	31.89 <sup>172</sup>	25.735 <sup>285</sup>	14.16 <sup>90</sup>	31.612 <sup>307</sup>	48.86 <sup>141</sup>
	272	19	415	194	266	55	289	135
Sept. 6.7	19.875	13.86	27.134	33.83	26.001	13.61	31.901	50.21
16.6	20.123 <sup>248</sup>	14.11 <sup>25</sup>	27.517 <sup>383</sup>	35.96 <sup>213</sup>	26.246 <sup>245</sup>	13.41 <sup>20</sup>	32.167 <sup>266</sup>	51.47 <sup>126</sup>
26.6	20.343 <sup>220</sup>	14.78 <sup>67</sup>	27.863 <sup>346</sup>	38.21 <sup>225</sup>	26.465 <sup>219</sup>	13.56 <sup>15</sup>	32.410 <sup>243</sup>	52.61 <sup>114</sup>
Oct. 6.6	20.533 <sup>190</sup>	15.83 <sup>105</sup>	28.169 <sup>306</sup>	40.57 <sup>236</sup>	26.657 <sup>192</sup>	14.03 <sup>47</sup>	32.625 <sup>215</sup>	53.62 <sup>101</sup>
16.6	20.691 <sup>158</sup>	17.21 <sup>138</sup>	28.432 <sup>263</sup>	42.99 <sup>242</sup>	26.820 <sup>163</sup>	14.81 <sup>78</sup>	32.812 <sup>187</sup>	54.50 <sup>88</sup>
	124	167	217	242	134	103	156	72
26.5	20.815	18.88	28.649	45.41	26.954	15.84	32.968	55.22
Nov. 5.5	20.906 <sup>91</sup>	20.74 <sup>186</sup>	28.817 <sup>168</sup>	47.80 <sup>239</sup>	27.057 <sup>103</sup>	17.07 <sup>123</sup>	33.094 <sup>126</sup>	55.82 <sup>60</sup>
15.5	20.962 <sup>56</sup>	22.72 <sup>198</sup>	28.933 <sup>116</sup>	50.10 <sup>230</sup>	27.128 <sup>71</sup>	18.44 <sup>137</sup>	33.190 <sup>96</sup>	56.28 <sup>46</sup>
25.4	20.984 <sup>22</sup>	24.75 <sup>203</sup>	28.996 <sup>63</sup>	52.25 <sup>215</sup>	27.169 <sup>41</sup>	19.89 <sup>145</sup>	33.251 <sup>61</sup>	56.61 <sup>33</sup>
Dec. 5.4	20.973 <sup>11</sup>	26.73 <sup>198</sup>	29.004 <sup>8</sup>	54.22 <sup>197</sup>	27.177 <sup>8</sup>	21.35 <sup>146</sup>	33.279 <sup>28</sup>	56.81 <sup>20</sup>
	43	187	48	172	22	142	5	9
15.4	20.930	28.60	28.956	55.94	27.155	22.77	33.274	56.90
25.4	20.855 <sup>75</sup>	30.28 <sup>168</sup>	28.855 <sup>101</sup>	57.37 <sup>143</sup>	27.103 <sup>52</sup>	24.10 <sup>133</sup>	33.234 <sup>40</sup>	56.87 <sup>3</sup>
35.3	20.751 <sup>104</sup>	31.73 <sup>145</sup>	28.705 <sup>150</sup>	58.44 <sup>107</sup>	27.022 <sup>81</sup>	25.28 <sup>118</sup>	33.162 <sup>72</sup>	56.72 <sup>15</sup>
Mean Place	16.333	43.61	21.811	25.44	22.329	40.10	27.735	32.67
Sec $\delta$ , Tan $\delta$	1.074	-0.391	1.640	+1.300	1.013	-0.162	1.071	+0.384
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.05	+0.02	+0.08	-0.06	+0.06	+0.01	+0.07	-0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	47 H. Cephei. Mag. 5.7		θ Eridani. Mag. 3.4		α Ceti. Mag. 2.8		τ <sup>3</sup> Eridani. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 54 s	° ' " +79 5	h m 2 55 s	° ' " -40 37	h m 2 57 s	° ' " + 3 45	h m 2 58 s	° ' " -23 56
Jan. 0.3	65.57	55.41 180	8.843	77.75 152	58.131	59.57 75	45.736	58.21 139
10.3	64.81 76	57.21 124	8.666 177	79.27 106	58.048 83	58.82 75	45.618 118	59.60 139
20.3	63.92 89	58.45 66	8.462 204	80.33 58	57.940 108	58.14 68	45.477 141	60.65 105
30.3	62.94 98	59.11 4	8.240 222	80.91 10	57.812 128	57.52 62	45.315 162	61.36 71
Feb. 9.2	61.92 102	59.15 55	8.006 234	81.01 38	57.670 142	56.99 43	45.141 174	61.71 35
	102		235		148		179	2
19.2	60.90	58.60	7.771	80.63	57.522	56.56 31	44.962	61.69
Mar. 1.2	59.92 98	57.47 113	7.541 230	79.77 86	57.376 140	56.25 16	44.787 175	61.30 39
11.2	59.04 88	55.81 166	7.328 213	78.46 131	57.240 136	56.09 2	44.624 163	60.54 76
21.1	58.28 76	53.70 211	7.140 188	76.74 172	57.126 114	56.07	44.481 143	59.44 110
31.1	57.70 58	51.23 247	6.987 153	74.64 210	57.040 86	56.23 16	44.368 113	58.02 142
	40	272	111	242	53	34	78	173
Apr. 10.1	57.30	48.51	6.876	72.22	56.987	56.57 54	44.290 36	56.29
20.0	57.11 19	45.64 287	6.813 63	69.50 272	56.976 11	57.11 76	44.254 10	54.29 200
30.0	57.14 3	42.72 292	6.803 10	66.56 294	57.010 34	57.87 94	44.264 57	52.06 223
May 10.0	57.40 26	39.87 285	6.848 45	63.45 311	57.089 79	58.81 116	44.321 105	49.63 243
20.0	57.86 46	37.20 267	6.947 99	60.25 320	57.213 124	59.97 133	44.426 150	47.05 258
	67	243	152	322	167			265
29.9	58.53	34.77	7.099	57.03	57.380	61.30 147	44.576 193	44.40 269
June 8.9	59.37 84	32.66 211	7.301 202	53.86 317	57.586 206	62.77 160	44.769 230	41.71 269
18.9	60.36 99	30.94 172	7.548 247	50.83 303	57.825 239	64.37 168	44.999 262	39.07 264
28.9	61.48 112	29.66 128	7.832 284	47.99 284	58.093 268	66.05 170	45.261 286	36.54 253
July 8.8	62.71 123	28.84 82	8.147 315	45.45 254	58.381 288	67.75 168	45.547 304	34.17 237
	130	33	337	218	302			212
18.8	64.01	28.51	8.484	43.27	58.683	69.43 161	45.851 313	32.05 182
28.8	65.34 133	28.66 15	8.835 351	41.50 177	58.990 307	71.04 150	46.164 316	30.23 145
Aug. 7.7	66.69 135	29.30 64	9.191 356	40.21 129	59.297 307	72.54 134	46.480 310	28.78 105
17.7	68.02 133	30.40 110	9.540 349	39.42 79	59.596 299	73.88 114	46.790 297	27.73 62
27.7	69.31 129	31.95 155	9.878 338	39.18 24	59.884 288	75.02 91	47.087 281	27.11 16
	122	195	316	31	271			
Sept. 6.7	70.53	33.90	10.194	39.49	60.155	75.93 66	47.368 257	26.95 30
16.6	71.67 114	36.22 232	10.484 290	40.34 85	60.405 250	76.59 41	47.625 232	27.25 74
26.6	72.71 104	38.88 266	10.740 256	41.70 136	60.632 227	77.00 16	47.857 201	27.99 114
Oct. 6.6	73.63 92	41.80 202	10.958 218	43.52 182	60.832 200	77.16 8	48.058 169	29.13 151
16.6	74.40 77	44.95 315	11.136 178	45.72 220	61.005 173	77.08 30	48.227 136	30.64 179
	60	330	134	251	146			
26.5	75.00	48.25	11.270	48.23	61.151 116	76.78 47	48.363 101	32.43 200
Nov. 5.5	75.44 44	51.63 338	11.360 90	50.93 270	61.267 87	76.31 62	48.464 65	34.43 215
15.5	75.69 25	55.00 337	11.403 43	53.73 280	61.354 55	75.69 73	48.529 30	36.58 219
25.4	75.75 6	58.30 330	11.403 0	56.53 280	61.409 24	74.96 79	48.559 5	38.77 214
Dec. 5.4	75.62 13	61.43 313	11.358 45	59.21 268	61.433 6	74.17 82	48.554 39	40.91 203
	33	287	87	246				
15.4	75.29	64.30	11.271	61.67	61.427	73.35 82	48.515 73	42.94 184
25.4	74.78 51	66.81 251	11.146 125	63.82 215	61.388 39	72.53 80	48.442 102	44.78 157
35.3	74.10 68	68.89 208	10.985 161	65.62 180	61.319 69	71.73	48.340	46.35
Mean Place	59.610	32.52	6.964	72.34	56.323	53.30	43.945	56.75
Sec δ, Tan δ	5.285	+5.190	1.317	-0.858	1.002	+0.066	1.094	-0.444
D <sub>δ</sub> α, D <sub>α</sub> α	+0.16	-0.25	+0.05	+0.04	+0.06	0.00	+0.05	+0.02
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Persei. (Algol.) Var. 2.1-3.2		$\delta$ Arietis. Mag. 4.5		12 Eridani. Mag. 4.0		48 H. Cephei. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 2	° ' " +40 38	h m 3 6	° ' " +19 24	h m 3 8	° ' " -29 18	h m 3 9	° ' " +77 25
	s	"	s	"	s	"	s	"
Jan. 0.4	47.956	28.58 55	54.742	59.73 24	34.512	52.12 151	50.12 60	75.23 189
10.3	47.841 115	29.13 24	54.663 79	59.49 32	34.385 127	53.63 116	49.52 73	77.12 138
20.3	47.691 150	29.37 6	54.554 109	59.17 41	34.232 153	54.79 76	48.79 82	78.50 81
30.3	47.513 178	29.31 37	54.422 132	58.76 50	34.057 175	55.55 35	47.97 87	79.31 22
Feb. 9.2	47.315 198	28.94 67	54.274 148	58.26 56	33.868 189	55.90 6	47.10 89	79.53 38
19.2	47.110 205	28.27 93	54.117 157	57.70 61	33.673 194	55.84 46	46.21 86	79.15 96
Mar. 1.2	46.908 187	27.34 117	53.960 146	57.09 63	33.479 182	55.38 86	45.35 78	78.19 140
11.2	46.721 158	26.17 133	53.814 125	56.46 61	33.297 161	54.52 125	44.57 69	76.70 195
21.1	46.563 119	24.84 144	53.689 96	55.85 56	33.136 132	53.27 160	43.88 56	74.75 233
31.1	46.444 72	23.40 140	53.593 57	55.29 48	33.004 97	51.67 192	43.32 38	72.42 262
Apr. 10.1	46.372 17	21.91 147	53.536 15	54.81 34	32.907 54	49.75 222	42.94 22	69.80 278
20.1	46.355 42	20.44 137	53.521 32	54.47 18	32.853 7	47.53 245	42.72 3	67.02 286
30.0	46.397 100	19.07 122	53.553 81	54.29 0	32.846 42	45.08 266	42.69 18	64.16 283
May 10.0	46.497 160	17.85 102	53.634 129	54.29 21	32.888 92	42.42 280	42.87 35	61.33 268
20.0	46.657 215	16.83 77	53.763 175	54.50 40	32.980 139	39.62 287	43.22 54	58.65 248
29.9	46.872 264	16.06 50	53.938 216	54.90 63	33.119 185	36.75 289	43.76 60	56.17 218
June 8.9	47.136 307	15.56 20	54.154 253	55.53 82	33.304 225	33.86 284	44.45 84	53.99 183
18.9	47.443 342	15.36 10	54.407 281	56.35 99	33.529 260	31.02 270	45.29 96	52.16 141
28.9	47.785 368	15.46 38	54.688 305	57.34 115	33.789 286	28.32 249	46.25 106	50.75 98
July 8.8	48.153 385	15.84 67	54.993 318	58.49 126	34.075 307	25.83 222	47.31 112	49.77 50
18.8	48.538 393	16.51 92	55.311 326	59.75 133	34.382 318	23.61 190	48.43 117	49.27 4
28.8	48.931 393	17.43 115	55.637 326	61.08 136	34.700 324	21.71 149	49.60 119	49.23 44
Aug. 7.8	49.324 387	18.58 135	55.963 320	62.44 136	35.024 320	20.22 105	50.79 119	49.67 89
17.7	49.711 372	19.93 151	56.283 308	63.80 132	35.344 310	19.17 58	51.98 116	50.56 134
27.7	50.083 352	21.44 164	56.591 293	65.12 124	35.654 294	18.59 8	53.14 111	51.90 175
Sept. 6.7	50.435 329	23.08 173	56.884 273	66.36 113	35.948 273	18.51 41	54.25 105	53.65 213
16.6	50.764 300	24.81 179	57.157 248	67.49 102	36.221 245	18.92 89	55.30 96	55.78 245
26.6	51.064 269	26.60 181	57.405 225	68.51 87	36.466 215	19.81 132	56.25 86	58.23 275
Oct. 6.6	51.333 237	28.41 181	57.630 197	69.38 73	36.681 183	21.13 171	57.11 74	60.98 298
16.6	51.570 201	30.22 178	57.827 168	70.11 59	36.864 147	22.84 203	57.85 61	63.96 315
26.5	51.771 163	32.00 172	57.995 139	70.70 46	37.011 110	24.87 225	58.46 45	67.11 326
Nov. 5.5	51.934 123	33.72 162	58.134 107	71.16 33	37.121 73	27.12 239	58.91 31	70.37 329
15.5	52.057 81	35.34 150	58.241 74	71.49 21	37.194 34	29.51 243	59.22 14	73.66 324
25.5	52.138 37	36.84 136	58.315 42	71.70 10	37.228 3	31.94 239	59.36 4	76.90 310
Dec. 5.4	52.175 7	38.20 116	58.357 6	71.80 1	37.225 41	34.33 225	59.32 21	80.00 288
15.4	52.168 51	39.36 95	58.363 29	71.81 10	37.184 77	36.58 202	59.11 38	82.88 256
25.4	52.117 93	40.31 68	58.334 63	71.71 19	37.107 110	38.60 173	58.73 52	85.44 216
35.3	52.024	40.99	58.271	71.52	36.997	40.33	58.21	87.60
Mean Place	45.724	12.42	52.788	49.19	32.655	49.45	44.362	53.42
Sec $\delta$ , Tan $\delta$	1.318	+0.858	1.060	+0.352	1.147	-0.561	4.596	+4.486
D $\phi$ $\alpha$ , D $\omega$ $\alpha$	+0.08	-0.04	+0.07	-0.02	+0.05	+0.03	+0.15	-0.20
D $\phi$ $\delta$ , D $\omega$ $\delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	<i>ε</i> Eridani. Mag. 4.3			<i>ι</i> Hydri. Mag. 5.5			<i>α</i> Persei. Mag. 1.9			<i>ο</i> Tauri. Mag. 3.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	3	16	-43 22	3	17	-77 40	3	18	+49 34	3	20	+ 8 44
	s		"	s		"	s		"	s		"
Jan. 0.4	38.765		77.02	64.19		100.85	25.954		17.71	22.605		22.58
10.3	38.592	173	78.76	63.26	93	102.44	25.822	132	18.70	22.535	70	21.97
20.3	38.388	204	80.05	62.24	102	103.47	25.644	178	19.33	22.436	99	21.38
30.3	38.161	227	80.84	61.16	108	103.88	25.429	215	19.59	22.312	124	20.82
Feb. 9.3	37.917	244	81.14	60.06	110	103.73	25.190	239	19.47	22.170	142	20.30
		253			111			253			152	
19.2	37.664		80.92	58.95		102.99	24.937		18.97	22.018		19.83
Mar. 1.2	37.415	249	80.22	57.88	107	101.69	24.685	252	18.11	21.863	155	19.43
11.2	37.180	235	79.02	56.87	101	99.89	24.449	236	16.92	21.716	147	19.11
21.1	36.968	212	77.40	55.94	93	97.65	24.243	206	15.47	21.588	128	18.91
31.1	36.788	180	75.37	55.12	82	94.97	24.080	163	13.81	21.484	104	18.83
		137			70			109			69	
Apr. 10.1	36.651		72.99	54.42		91.98	23.971		12.02	21.415		18.89
20.1	36.561	90	70.28	53.87	55	88.72	23.924	47	10.19	21.385	30	19.13
30.0	36.522	39	67.34	53.48	39	85.29	23.943	19	8.37	21.400	15	19.55
May 10.0	36.540	18	64.20	53.25	23	81.71	24.031	88	6.67	21.461	61	20.15
20.0	36.616	76	60.94	53.19	6	78.08	24.187	156	5.12	21.568	107	20.95
		132			12			221			151	
30.0	36.748		57.64	53.31		74.52	24.408		3.78	21.719		21.93
June 8.9	36.933	185	54.37	53.59	28	71.09	24.689	281	2.72	21.910	191	23.08
18.9	37.168	235	51.20	54.04	45	67.89	25.021	332	1.96	22.139	229	24.36
28.9	37.445	277	48.24	54.64	60	64.96	25.395	374	1.51	22.397	258	25.75
July 8.8	37.758	313	45.53	55.37	73	62.42	25.803	408	1.40	22.678	281	27.21
		341			84			431			297	
18.8	38.099		43.18	56.21		60.32	26.234		1.62	22.975		28.69
28.8	38.458	359	41.25	57.14	93	58.74	26.680	446	2.14	23.283	308	30.16
Aug. 7.8	38.827	369	39.80	58.12	98	57.72	27.130	450	2.97	23.593	310	31.56
17.7	39.196	369	38.87	59.13	101	57.30	27.575	445	4.08	23.898	305	32.85
27.7	39.558	362	38.48	60.14	101	57.46	28.009	434	5.43	24.195	297	33.99
		344			96			416			284	
Sept. 6.7	39.902		38.67	61.10		58.27	28.425		7.00	24.479		34.95
16.7	40.224	322	39.42	62.00	90	59.70	28.817	392	8.74	24.744	265	35.71
26.6	40.514	290	40.71	62.80	80	61.63	29.179	332	10.62	24.990	246	36.26
Oct. 6.6	40.770	256	42.50	63.47	67	64.09	29.509	330	12.61	25.212	222	36.58
16.6	40.984	214	44.70	63.99	52	66.93	29.801	292	14.68	25.409	197	36.71
		169			34			252			170	
26.5	41.153		47.25	64.33		70.08	30.053		16.80	25.579		36.64
Nov. 5.5	41.277	124	50.03	64.50	17	73.41	30.261	208	18.90	25.722	143	36.40
15.5	41.352	75	52.96	64.46	4	76.80	30.422	161	20.97	25.834	112	36.03
25.5	41.379	27	55.91	64.24	22	80.13	30.532	110	22.96	25.914	80	35.54
Dec. 5.4	41.358	21	58.78	63.84	40	83.25	30.590	58	24.82	25.963	49	34.98
		68			58			1			14	
15.4	41.290		61.43	63.26		86.08	30.591		26.49	25.977		34.38
25.4	41.178	112	63.82	62.53	73	88.51	30.539	52	27.93	25.957	20	33.75
35.4	41.027	151	65.83	61.67	86	90.46	30.433	106	29.09	25.905	52	33.12
Mean Place	36.756		71.60	60.035		91.67	23.335		0.45	20.663		15.33
Sec <i>δ</i> , Tan <i>δ</i>	1.376		-0.945	4.690		-4.582	1.542		+1.174	1.012		+0.154
<i>Dψ α</i> , <i>Dω α</i>	+0.04		+0.04	-0.03		+0.20	+0.08		-0.05	+0.06		-0.01
<i>Dψ δ</i> , <i>Dω δ</i>	+0.3		+0.8	+0.3		+0.8	+0.3		+0.8	+0.3		+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	2 H. Camelop. Mag. 4.4		ξ Tauri. Mag. 3.8		f Tauri. Mag. 4.3		ε Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 22	° ' " +59 39	h m 3 22	° ' " + 9 26	h m 3 26	° ' " +12 39	h m 3 29	° ' " - 9 43
	s	"	s	"	s	"	s	"
Jan. 0.4	23.405	26.93	42.084	45.68	19.302	19.25	3.035	76.12
10.3	23.215 190	28.33 140	42.016 68	45.09 59	19.236 66	18.79 46	2.955 80	77.34 122
20.3	22.967 248	29.32 99	41.919 97	44.52 57	19.140 96	18.31 48	2.844 111	78.37 103
30.3	22.672 295	29.87 55	41.796 123	43.98 54	19.016 124	17.83 48	2.709 135	79.16 79
Feb. 9.3	22.346 326	29.95 8	41.654 142	43.47 51	18.873 143	17.34 49	2.557 152	79.73 57
	342	40	152	47	154	48	164	31
19.2	22.004	29.55	41.502	43.00	18.719	16.86	2.393	80.04 7
Mar. 1.2	21.664 340	28.71 84	41.347 155	42.59 41	18.562 157	16.41 45	2.228 165	80.11 —
11.2	21.344 320	27.45 126	41.200 147	42.26 33	18.411 151	16.01 40	2.070 158	79.91 20
21.1	21.063 281	25.83 162	41.069 131	42.04 22	18.277 134	15.67 34	1.927 143	79.45 46
31.1	20.836 227	23.94 189	40.964 105	41.93 11	18.170 107	15.43 24	1.810 117	78.73 72
	160	211	70	3	74	12	85	96
Apr. 10.1	20.676	21.83	40.894	41.96	18.096	15.31	1.725	77.77
20.1	20.595 81	19.61 222	40.862 32	42.16 20	18.063 33	15.32 1	1.677 48	76.55 122
30.0	20.599 4	17.36 225	40.875 13	42.53 37	18.074 11	15.51 19	1.673 4	75.11 144
May 10.0	20.689 90	15.17 219	40.933 58	43.08 55	18.131 57	15.87 36	1.714 41	73.45 166
20.0	20.864 175	13.13 204	41.039 106	43.84 76	18.236 105	16.42 55	1.801 87	71.62 183
	257	185	150	93	149	74	131	197
30.0	21.121	11.28	41.189	44.77	18.385	17.16	1.932	69.65
June 8.9	21.453 332	9.71 157	41.379 190	45.85 108	18.576 191	18.07 91	2.105 173	67.59 206
18.9	21.851 398	8.46 125	41.607 228	47.11 126	18.804 228	19.13 106	2.314 209	65.46 213
28.9	22.305 454	7.54 92	41.865 258	48.45 134	19.063 259	20.33 120	2.554 240	63.36 210
July 8.8	22.802 497	7.01 53	42.146 281	49.88 143	19.346 283	21.62 129	2.820 266	61.32 204
	529	16	297	145	301	135	284	193
18.8	23.331	6.85	42.443	51.33	19.647	22.97	3.104	59.39
28.8	23.880 549	7.07 22	42.751 308	52.77 144	19.957 310	24.33 136	3.398 294	57.66 173
Aug. 7.8	24.438 558	7.66 59	43.061 310	54.16 139	20.271 314	25.66 133	3.698 300	56.13 153
17.7	24.993 555	8.60 94	43.369 308	55.45 129	20.582 311	26.92 126	3.997 299	54.91 122
27.7	25.535 542	9.87 127	43.667 298	56.58 113	20.884 302	28.07 115	4.287 290	54.00 91
	522	157	286	97	290	102	278	55
Sept. 6.7	26.057	11.44	43.953	57.55	21.174	29.09	4.565	53.45
16.7	26.551 494	13.27 183	44.222 269	58.32 77	21.448 274	29.94 85	4.825 260	53.26 19
26.6	27.009 458	15.34 207	44.468 246	58.89 57	21.701 253	30.62 68	5.065 240	53.44 18
Oct. 6.6	27.426 417	17.59 225	44.693 225	59.26 37	21.932 231	31.10 48	5.281 216	53.95 51
16.6	27.797 371	19.98 239	44.892 199	59.40 14	22.137 205	31.40 30	5.472 191	54.80 85
	318	250	173	4	181	14	163	113
26.5	28.115	22.48	45.065	59.36	22.318	31.54	5.635	55.93
Nov. 5.5	28.375 260	25.03 255	45.210 145	59.16 20	22.469 151	31.52 2	5.769 134	57.27 134
15.5	28.573 198	27.59 256	45.325 115	58.82 34	22.590 121	31.37 15	5.870 101	58.77 150
25.5	28.702 129	30.08 249	45.408 83	58.37 45	22.681 91	31.11 26	5.940 70	60.36 159
Dec. 5.4	28.763 61	32.46 238	45.460 52	57.85 52	22.737 56	30.78 33	5.976 36	61.98 162
	12	218	16	57	22	40	3	158
15.4	28.751	34.64	45.476	57.28	22.759	30.38	5.979	63.56
25.4	28.666 85	36.58 194	45.459 17	56.69 59	22.745 14	29.94 44	5.947 32	65.05 149
35.4	28.512 154	38.19 161	45.408 51	56.08 61	22.697 48	29.48 46	5.881 66	66.41 136
Mean Place	20.239	8.13	40.128	38.30	17.304	11.11	1.141	78.21
Sec δ, Tan δ	1.979	+1.708	1.014	+0.166	1.025	+0.224	1.015	-0.172
Dψ α, Dω α	+0.10	-0.07	+0.06	-0.01	+0.06	-0.01	+0.06	+0.01
Dψ δ, Dω δ	+0.3	+0.8	+0.3	+0.8	+0.2	+0.8	+0.2	+0.8



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau^5$ Eridani. Mag. 4.3		$\delta$ Persei. Mag. 3.1		$\delta$ Eridani. Mag. 3.7		$\nu$ Persei. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 30 s	° ' " -21 54 "	h m 3 37 s	° ' " +47 31 "	h m 3 39 s	° ' " -10 2 "	h m 3 39 s	° ' " +42 19 "
Jan. 0.4	9.119	39.15	3.208	39.42	18.243	35.44	35.532	17.52
10.3	9.023 <sup>96</sup>	40.72 <sup>157</sup>	3.102 <sup>106</sup>	40.44 <sup>102</sup>	18.171 <sup>72</sup>	36.72 <sup>128</sup>	35.444 <sup>88</sup>	18.33 <sup>81</sup>
20.3	8.896 <sup>127</sup>	41.98 <sup>126</sup>	2.949 <sup>153</sup>	41.15 <sup>71</sup>	18.069 <sup>102</sup>	37.79 <sup>107</sup>	35.312 <sup>132</sup>	18.88 <sup>55</sup>
30.3	8.744 <sup>152</sup>	42.92 <sup>94</sup>	2.756 <sup>193</sup>	41.53 <sup>38</sup>	17.939 <sup>130</sup>	38.64 <sup>85</sup>	35.142 <sup>170</sup>	19.14 <sup>26</sup>
Feb. 9.3	8.573 <sup>171</sup>	43.51 <sup>59</sup>	2.532 <sup>224</sup>	41.56 <sup>3</sup>	17.789 <sup>150</sup>	39.24 <sup>60</sup>	34.944 <sup>198</sup>	19.10 <sup>4</sup>
	181	23	240	33	163	37	216	35
19.2	8.392	43.74	2.292	41.23	17.626	39.61	34.728	18.75
Mar. 1.2	8.209 <sup>183</sup>	43.61 <sup>13</sup>	2.046 <sup>246</sup>	40.55 <sup>68</sup>	17.459 <sup>167</sup>	39.72 <sup>11</sup>	34.507 <sup>221</sup>	18.11 <sup>64</sup>
11.2	8.032 <sup>177</sup>	43.14 <sup>47</sup>	1.811 <sup>235</sup>	39.56 <sup>99</sup>	17.297 <sup>162</sup>	39.55 <sup>17</sup>	34.296 <sup>211</sup>	17.21 <sup>90</sup>
21.2	7.872 <sup>160</sup>	42.30 <sup>84</sup>	1.601 <sup>210</sup>	38.30 <sup>126</sup>	17.148 <sup>149</sup>	39.13 <sup>42</sup>	34.104 <sup>192</sup>	16.08 <sup>113</sup>
31.1	7.736 <sup>136</sup>	41.13 <sup>117</sup>	1.427 <sup>174</sup>	36.83 <sup>147</sup>	17.023 <sup>125</sup>	38.44 <sup>69</sup>	33.947 <sup>157</sup>	14.79 <sup>129</sup>
	102	145	125	162	96	93	114	141
Apr. 10.1	7.634	39.68	1.302	35.21	16.927	37.51	33.833	13.38
20.1	7.570 <sup>64</sup>	37.91 <sup>177</sup>	1.235 <sup>67</sup>	33.52 <sup>169</sup>	16.869 <sup>58</sup>	36.32 <sup>119</sup>	33.771 <sup>62</sup>	11.92 <sup>146</sup>
30.0	7.550 <sup>20</sup>	35.88 <sup>203</sup>	1.231 <sup>4</sup>	31.82 <sup>170</sup>	16.853 <sup>16</sup>	34.90 <sup>142</sup>	33.768 <sup>3</sup>	10.49 <sup>143</sup>
May 10.0	7.576 <sup>26</sup>	33.65 <sup>223</sup>	1.292 <sup>61</sup>	30.20 <sup>162</sup>	16.882 <sup>29</sup>	33.26 <sup>164</sup>	33.824 <sup>56</sup>	9.13 <sup>136</sup>
20.0	7.650 <sup>74</sup>	31.25 <sup>240</sup>	1.419 <sup>127</sup>	28.71 <sup>149</sup>	16.957 <sup>75</sup>	31.44 <sup>182</sup>	33.942 <sup>118</sup>	7.91 <sup>122</sup>
	120	252	192	132	119	196	176	104
30.0	7.770	28.73	1.611	27.39	17.076	29.48	34.118	6.87
June 8.9	7.934 <sup>164</sup>	26.13 <sup>260</sup>	1.860 <sup>249</sup>	26.32 <sup>107</sup>	17.237 <sup>161</sup>	27.41 <sup>207</sup>	34.348 <sup>230</sup>	6.06 <sup>81</sup>
18.9	8.138 <sup>204</sup>	23.56 <sup>257</sup>	2.162 <sup>302</sup>	25.51 <sup>81</sup>	17.437 <sup>200</sup>	25.27 <sup>214</sup>	34.627 <sup>279</sup>	5.49 <sup>57</sup>
28.9	8.375 <sup>237</sup>	21.04 <sup>252</sup>	2.509 <sup>347</sup>	24.99 <sup>52</sup>	17.669 <sup>232</sup>	23.13 <sup>214</sup>	34.947 <sup>320</sup>	5.20 <sup>29</sup>
July 8.9	8.641 <sup>266</sup>	18.65 <sup>239</sup>	2.890 <sup>381</sup>	24.76 <sup>23</sup>	17.928 <sup>259</sup>	21.06 <sup>207</sup>	35.300 <sup>353</sup>	5.16 <sup>4</sup>
	287	217	408	7	278	197	377	24
18.8	8.928	16.48	3.298	24.83	18.206	19.09	35.677	5.40
28.8	9.230 <sup>302</sup>	14.56 <sup>192</sup>	3.723 <sup>425</sup>	25.20 <sup>37</sup>	18.498 <sup>292</sup>	17.30 <sup>179</sup>	36.069 <sup>392</sup>	5.88 <sup>48</sup>
Aug. 7.8	9.538 <sup>308</sup>	12.98 <sup>158</sup>	4.156 <sup>433</sup>	25.85 <sup>65</sup>	18.796 <sup>298</sup>	15.74 <sup>156</sup>	36.471 <sup>402</sup>	6.60 <sup>72</sup>
17.7	9.846 <sup>308</sup>	11.78 <sup>120</sup>	4.589 <sup>433</sup>	26.74 <sup>89</sup>	19.096 <sup>300</sup>	14.46 <sup>128</sup>	36.870 <sup>399</sup>	7.53 <sup>93</sup>
27.7	10.147 <sup>301</sup>	11.00 <sup>78</sup>	5.015 <sup>426</sup>	27.87 <sup>113</sup>	19.390 <sup>294</sup>	13.50 <sup>96</sup>	37.264 <sup>394</sup>	8.65 <sup>112</sup>
	290	34	412	132	283	61	381	127
Sept. 6.7	10.437	10.66	5.427	29.19	19.673	12.89	37.645	9.92
16.7	10.710 <sup>273</sup>	10.78 <sup>12</sup>	5.819 <sup>392</sup>	30.69 <sup>150</sup>	19.942 <sup>269</sup>	12.66 <sup>23</sup>	38.008 <sup>363</sup>	11.31 <sup>139</sup>
26.6	10.961 <sup>251</sup>	11.35 <sup>57</sup>	6.187 <sup>368</sup>	32.33 <sup>164</sup>	20.191 <sup>249</sup>	12.79 <sup>13</sup>	38.349 <sup>341</sup>	12.80 <sup>149</sup>
Oct. 6.6	11.187 <sup>226</sup>	12.35 <sup>100</sup>	6.525 <sup>338</sup>	34.08 <sup>175</sup>	20.419 <sup>228</sup>	13.28 <sup>49</sup>	38.663 <sup>314</sup>	14.36 <sup>156</sup>
16.6	11.384 <sup>197</sup>	13.72 <sup>137</sup>	6.831 <sup>306</sup>	35.92 <sup>184</sup>	20.622 <sup>203</sup>	14.10 <sup>82</sup>	38.949 <sup>286</sup>	15.96 <sup>160</sup>
	167	170	269	188	176	111	251	163
26.6	11.551	15.42	7.100	37.80	20.798	15.21	39.200	17.59
Nov. 5.5	11.686 <sup>135</sup>	17.37 <sup>195</sup>	7.329 <sup>229</sup>	39.70 <sup>190</sup>	20.946 <sup>148</sup>	16.54 <sup>133</sup>	39.416 <sup>216</sup>	19.21 <sup>162</sup>
15.5	11.787 <sup>101</sup>	19.50 <sup>213</sup>	7.513 <sup>184</sup>	41.59 <sup>189</sup>	21.063 <sup>117</sup>	18.04 <sup>150</sup>	39.591 <sup>175</sup>	20.81 <sup>160</sup>
25.5	11.852 <sup>65</sup>	21.71 <sup>221</sup>	7.649 <sup>136</sup>	43.43 <sup>184</sup>	21.147 <sup>84</sup>	19.66 <sup>162</sup>	39.724 <sup>133</sup>	22.34 <sup>153</sup>
Dec. 5.4	11.880 <sup>28</sup>	23.91 <sup>220</sup>	7.734 <sup>85</sup>	45.17 <sup>174</sup>	21.199 <sup>52</sup>	21.32 <sup>166</sup>	39.810 <sup>86</sup>	23.78 <sup>144</sup>
	9	212	32	159	15	161	37	132
15.4	11.871	26.03	7.766	46.76	21.214	22.93	39.847	25.10
25.4	11.828 <sup>43</sup>	28.00 <sup>197</sup>	7.742 <sup>24</sup>	48.17 <sup>141</sup>	21.194 <sup>20</sup>	24.46 <sup>153</sup>	39.835 <sup>12</sup>	26.24 <sup>114</sup>
35.4	11.749 <sup>79</sup>	29.74 <sup>174</sup>	7.664 <sup>78</sup>	49.34 <sup>117</sup>	21.141 <sup>53</sup>	25.86 <sup>140</sup>	39.772 <sup>63</sup>	27.18 <sup>94</sup>
Mean Place	7.202	38.44	0.504	23.67	16.294	37.56	32.977	2.94
Sec $\delta$ , Tan $\delta$	1.078	-0.402	1.481	+1.092	1.016	-0.177	1.353	+0.910
$D_{\delta} \alpha$ , $D_{\alpha} \alpha$	+0.05	+0.02	+0.08	-0.04	+0.06	+0.01	+0.08	-0.04
$D_{\delta} \delta$ , $D_{\alpha} \delta$	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydri. Mag. 3.2			ζ Persei. Mag. 2.9			9 H. Camelop. Mag. 5.2			ε Persei. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	3	48	-74 29	3	48	+31 38	3	50	+60 51	3	52	+39 46
	s		"	s		"	s		"	s		"
Jan. 0.4	34.33		44.67 205	56.997		29.05 38	6.52		78.17 165	19.355		29.53 75
10.4	33.66 67		46.72 153	56.936 61		29.43 21	6.35 17		79.82 128	19.285 70		30.28 54
20.3	32.91 75		48.25 96	56.834 102		29.64 3	6.12 23		81.10 87	19.169 116		30.82 27
30.3	32.09 82		49.21 38	56.699 135		29.67 16	5.84 28		81.97 41	19.015 154		31.09 2
Feb. 9.3	31.22 87		49.59 20	56.536 163		29.51 34	5.51 33		82.38 6	18.831 184		31.11 26
		88			180			36			204	
19.2	30.34		49.39 76	56.356		29.17 53	5.15		82.32 52	18.627		30.85 52
Mar. 1.2	29.46 88		48.63 130	56.168 188		28.64 70	4.79 36		81.80 96	18.413 214		30.33 78
11.2	28.60 86		47.33 180	55.984 184		27.94 81	4.43 36		80.84 136	18.206 207		29.55 97
21.2	27.81 79		45.53 225	55.817 167		27.13 90	4.11 32		79.48 170	18.015 191		28.58 115
31.1	27.08 73		43.28 263	55.676 141		26.23 94	3.84 27		77.78 196	17.855 160		27.43 125
		63			103			21			120	
Apr. 10.1	26.45		40.65 297	55.573		25.29 94	3.63		75.82 215	17.735 72		26.18 131
20.1	25.92 53		37.68 323	55.514 59		24.35 88	3.50 13		73.67 223	17.663 17		24.87 129
30.1	25.52 40		34.45 342	55.504 10		23.47 78	3.45 5		71.44 224	17.646 40		23.58 123
May 10.0	25.24 28		31.03 354	55.547 43		22.69 63	3.48 3		69.20 216	17.686 101		22.35 110
20.0	25.11 13		27.49 356	55.645 98		22.06 47	3.61 13		67.04 203	17.787 157		21.25 94
		0			149			21				
30.0	25.11		23.93 350	55.794		21.59 26	3.82		65.01 181	17.944 210		20.31 74
June 8.9	25.25 14		20.43 337	55.991 197		21.33 6	4.13 31		63.20 154	18.154 258		19.57 53
18.9	25.54 29		17.06 313	56.232 241		21.27 15	4.50 37		61.66 124	18.412 299		19.04 27
28.9	25.95 41		13.93 283	56.509 308		21.42 35	4.93 43		60.42 91	18.711 332		18.77 4
July 8.9	26.47 52		11.10 243	56.817 329		21.77 54	5.41 48		59.51 54	19.043 359		18.73 20
		63						53				
18.8	27.10		8.67 196	57.146		22.31 72	5.94		58.97 18	19.402 376		18.93 42
28.8	27.80 70		6.71 143	57.491 345		23.03 84	6.49 55		58.79 18	19.778 385		19.35 65
Aug. 7.8	28.57 77		5.28 86	57.845 354		23.87 96	7.06 57		58.97 53	20.163 387		20.00 82
17.8	29.38 81		4.42 24	58.199 348		24.83 105	7.64 58		59.50 88	20.550 383		20.82 98
27.7	30.20 82		4.18 39	58.547 340		25.88 110	8.21 57		60.38 119	20.933 373		21.80 111
		81						56				
Sept. 6.7	31.01		4.57 101	58.887		26.98 112	8.77		61.57 147	21.306 357		22.91 122
16.7	31.79 78		5.58 160	59.211 324		28.10 113	9.31 54		63.04 174	21.663 339		24.13 130
26.6	32.50 71		7.18 216	59.516 305		29.23 111	9.82 51		64.78 196	22.002 315		25.43 136
Oct. 6.6	33.13 63		9.34 264	59.801 285		30.34 108	10.30 48		66.74 217	22.317 289		26.79 140
16.6	33.65 52		11.98 301	60.060 259		31.42 104	10.73 43		68.91 232	22.606 258		28.19 141
		38			232			38				
26.6	34.03 25		14.99 327	60.292 201		32.46 99	11.11 31		71.23 242	22.864 224		29.60 141
Nov. 5.5	34.28 11		18.26 343	60.493 168		33.45 93	11.42 26		73.65 248	23.088 188		31.01 139
15.5	34.39 6		21.69 345	60.661 131		34.38 87	11.68 19		76.13 248	23.276 146		32.40 135
25.5	34.33 19		25.14 335	60.792 93		35.25 79	11.87 12		78.61 243	23.422 102		33.75 127
Dec. 5.5	34.14 34		28.49 312	60.885 49		36.04 69	11.99 4		81.04 231	23.524 54		35.02 117
15.4	33.80		31.61 280	60.934		36.73 58	12.03		83.35 210	23.578 5		36.19 104
25.4	33.31 49		34.41 237	60.939 38		37.31 46	11.99 4		85.45 184	23.583 45		37.23 87
35.4	32.71 60			60.901		37.77	11.88 11			23.538		38.10
Mean Place	30.514		36.94	54.636		17.23	2.934		61.14	16.786		16.22
Sec δ, Tan δ	3.740		-3.604	1.175		+0.616	2.054		+1.794	1.301		+0.832
D <sub>φ</sub> α, D <sub>ω</sub> α	-0.02		+0.13	+0.07		-0.02	+0.10		-0.06	+0.08		-0.03
D <sub>φ</sub> δ, D <sub>ω</sub> δ	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Persei. Mag. 4.0		γ Eridani. Mag. 3.2		λ Tauri. Var. 3.3-4.2		δ Reticuli. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 53 s	° ' " +35 33 "	h m 3 54 s	° ' " -13 44 "	h m 3 56 s	° ' " +12 15 "	h m 3 57 s	° ' " -61 37 "
Jan. 0.4	37.001	24.04 58	11.392	36.70 149	6.934	31.31 48	28.25	68.88 227
10.4	36.939 62	24.62 38	11.324 68	38.19 126	6.888 46	30.83 48	27.94 31	71.15 178
20.3	36.834 105	25.00 16	11.224 100	40.46 101	6.806 82	30.35 47	27.58 36	72.93 125
30.3	36.693 141	25.16 5	11.094 130	41.19 73	6.693 113	29.88 44	27.17 41	74.18 68
Feb. 9.3	36.521 172	25.11 29	10.941 153	41.63 14	6.555 138	29.44 43	26.72 45	74.86 11
19.3	36.331 190	24.82 50	10.772 175	41.77 15	6.400 163	29.01 39	26.26 47	74.97 46
Mar. 1.2	36.132 196	24.32 72	10.597 173	41.62 44	6.237 162	28.62 35	25.79 45	74.51 100
11.2	35.936 179	23.60 87	10.424 160	41.18 74	6.075 149	28.27 29	25.34 43	73.51 151
21.2	35.757 151	22.73 101	10.264 140	40.44 101	5.926 127	27.98 19	24.91 38	72.00 198
31.1	35.606 113	21.72 108	10.124 110	39.43 128	5.799 98	27.79 10	24.53 34	70.02 239
Apr. 10.1	35.493 68	20.64 111	10.014 74	38.15 154	5.701 59	27.69 2	24.19 27	67.63 277
20.1	35.425 16	19.53 108	9.940 33	36.61 175	5.642 17	27.71 17	23.92 21	64.86 307
30.1	35.409 39	18.45 100	9.907 12	34.86 193	5.625 29	27.88 33	23.71 13	61.79 329
May 10.0	35.448 96	17.45 87	9.919 57	32.93 210	5.654 76	28.21 49	23.58 5	58.50 344
20.0	35.544 149	16.58 70	9.976 103	30.83 220	5.730 122	28.70 67	23.53 4	55.06 353
30.0	35.693 199	15.88 52	10.079 146	28.63 224	5.852 164	29.37 82	23.57 12	51.53 351
June 8.9	35.892 246	15.36 29	10.225 184	26.39 224	6.016 204	30.19 96	23.69 20	48.02 342
18.9	36.138 284	15.07 9	10.409 220	24.15 216	6.220 237	31.15 108	23.89 27	44.60 324
28.9	36.422 316	14.98 15	10.629 249	21.99 203	6.457 265	32.23 117	24.16 33	41.36 296
July 8.9	36.738 340	15.13 35	10.878 270	19.96 185	6.722 285	33.40 121	24.49 39	38.40 200
18.8	37.078 358	15.48 54	11.148 286	18.11 158	7.007 299	34.61 123	24.88 44	35.80 217
28.8	37.436 366	16.02 72	11.434 296	16.53 128	7.306 309	35.84 118	25.32 47	33.63 167
Aug. 7.8	37.802 369	16.74 86	11.730 300	15.25 93	7.615 310	37.02 113	25.79 49	31.96 111
17.8	38.171 364	17.60 99	12.030 297	14.32 55	7.925 306	38.15 102	26.28 50	30.85 50
27.7	38.535 354	18.59 108	12.327 288	13.77 14	8.231 298	39.17 87	26.78 49	30.35 12
Sept. 6.7	38.889 341	19.67 114	12.615 276	13.63 26	8.529 286	40.04 70	27.27 47	30.47 75
16.7	39.230 322	20.81 120	12.891 259	13.89 65	8.815 271	40.74 53	27.74 44	31.22 137
26.6	39.552 300	22.01 121	13.150 239	14.54 100	9.086 251	41.27 35	28.18 39	32.59 193
Oct. 6.6	39.852 276	23.22 121	13.389 215	15.54 132	9.337 231	41.62 16	28.57 34	34.52 244
16.6	40.128 246	24.43 120	13.604 190	16.86 158	9.568 206	41.78 0	28.91 28	36.96 285
26.6	40.374 215	25.63 117	13.794 161	18.44 176	9.774 180	41.78 15	29.19 19	39.81 318
Nov. 5.5	40.589 180	26.80 114	13.955 130	20.20 187	9.954 151	41.63 28	29.38 12	42.99 337
15.5	40.769 142	27.94 109	14.085 97	22.07 192	10.105 120	41.35 37	29.50 4	46.36 344
25.5	40.911 100	29.03 93	14.182 62	25.87 178	10.225 85	40.98 47	29.54 4	49.80 340
Dec. 5.5	41.011 55	30.05 81	14.244 25	27.65 162	10.310 50	40.55 50	29.50 12	53.20 323
15.4	41.066 9	30.98 65	14.269 11	29.27 162	10.360 11	40.08 50	29.38 20	56.43 294
25.4	41.075 38	31.79 65	14.258 48		10.371 27	39.58 50	29.18 26	59.37 256
35.4	41.037	32.44	14.210		10.344	39.08	28.92	61.93
Mean Place	34.530	11.66	9.390	37.92	4.802	24.18	25.568	62.37
Sec δ, Tan δ	1.229	+0.715	1.029	-0.245	1.023	+0.217	2.105	-1.852
Dψ α, Dω α	+0.08	-0.03	+0.06	+0.01	+0.07	-0.01	+0.02	+0.06
ψ δ, Dω δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tauri. Mag. 3.9			α Tauri. Mag. 4.5			ε Persei. Mag. 4.0			ρ Tauri. Mag. 5.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	3	58	+ 5 45	3	59	+21 51	4	2	+47 29	4	5	+26 15
	s		"	s		"	s		"	s		"
Jan. 0.4	46.472		41.07	49.395		31.11	40.744		45.44	48.730		64.88
10.4	46.426	46	40.31 76	49.351	44	31.06 5	40.666	78	46.59 115	48.688	42	65.05 17
20.3	46.344	82	39.61 70	49.268	83	30.93 13	40.535	131	47.49 90	48.605	83	65.11 6
30.3	46.232	112	38.99 62	49.151	117	30.73 20	40.359	176	48.07 58	48.486	119	65.06 5
Feb. 9.3	46.096	136	38.45 54	49.008	143	30.45 28	40.144	215	48.33 26	48.339	147	64.90 16
		154			163			238			169	
19.3	45.942		38.00 35	48.845		30.09	39.906		48.24	48.170		64.60
Mar. 1.2	45.780	162	37.65 22	48.674	171	29.66 43	39.657	249	47.82 42	47.991	179	64.18 42
11.2	45.619	161	37.43 11	48.504	170	29.17 49	39.411	246	47.06 76	47.813	178	63.66 52
21.2	45.469	150	37.32	48.348	156	28.65 52	39.182	229	46.02 104	47.648	165	63.06 60
31.1	45.341	128	37.34 2	48.212	136	28.12 53	38.986	196	44.73 129	47.504	144	62.41 65
		100			103			152			111	
Apr. 10.1	45.241		37.53 34	48.109	63	27.61 44	38.834	98	43.26 158	47.393	71	61.74 64
20.1	45.179	62	37.87 52	48.046	18	27.17 36	38.736	38	41.68 164	47.322	25	61.10 59
30.1	45.157	23	38.39 70	48.028	29	26.81 22	38.698	27	40.04 162	47.297	24	60.51 49
May 10.0	45.180	69	39.09 86	48.057	78	26.59 9	38.725	94	38.42 154	47.321	75	60.02 36
20.0	45.249	114	39.95 103	48.135	127	26.50 7	38.819	156	36.88 141	47.396	124	59.66 19
30.0	45.363		40.98 119	48.262		26.57	38.975		35.47	47.520		59.47 4
June 9.0	45.519	156	42.17 129	48.434	172	26.83 26	39.193	218	34.26 121	47.693	173	59.43 14
18.9	45.714	195	43.46 138	48.647	213	27.24 41	39.466	273	33.26 100	47.907	214	59.57 31
28.9	45.941	227	44.84 143	48.896	249	27.81 57	39.787	321	32.52 74	48.159	252	59.88 47
July 8.9	46.197	256	46.27 144	49.173	277	28.53 72	40.148	361	32.04 48	48.440	281	60.35 62
		276			300			392			307	
18.8	46.473		47.71 139	49.473	315	29.35 92	40.540		31.85 7	48.747		60.97 74
28.8	46.765	292	49.10 131	49.788	324	30.27 98	40.954	414	31.92 33	49.070	323	61.71 83
Aug. 7.8	47.065	300	50.41 116	50.112	327	31.25 99	41.381	427	32.25 58	49.402	332	62.54 89
17.8	47.367	302	51.57 101	50.439	324	32.24 98	41.814	433	32.83 82	49.739	337	63.43 92
27.7	47.667	292	52.58 79	50.763	316	33.22 94	42.245	422	33.65 101	50.074	328	64.35 91
Sept. 6.7	47.959		53.37 57	51.079		34.16	42.667		34.66	50.402		65.26 90
16.7	48.239	280	53.94 32	51.382	303	35.03 78	43.076	409	35.87 135	50.718	316	66.16 86
26.7	48.503	264	54.26 9	51.670	288	35.81 68	43.464	388	37.22 148	51.018	300	67.02 80
Oct. 6.6	48.750	247	54.35 15	51.939	247	36.49 58	43.827	363	38.70 160	51.301	283	67.82 72
16.6	48.976	202	54.20 35	52.186	222	37.07 48	44.163	336	40.30 168	51.561	260	68.54 67
26.6	49.178		53.85 52	52.408		37.55	44.465		41.98	51.798		69.21 60
Nov. 5.5	49.354	176	53.33 68	52.604	196	37.94 29	44.730	265	43.71 176	52.007	209	69.81 53
15.5	49.503	149	52.65 78	52.769	165	38.23 21	44.952	222	45.47 175	52.183	178	70.34 48
25.5	49.620	117	51.87 83	52.902	133	38.44 16	45.126	174	47.22 170	52.327	144	70.82 41
Dec. 5.5	49.703	83	51.04 86	52.999	97	38.60 9	45.249	123	48.92 181	52.433	106	71.23 35
		48			58			68			66	
15.4	49.751		50.18 85	53.057	17	38.69 3	45.317		50.53 147	52.499		71.58 29
25.4	49.761	10	49.33 80	53.074	23	38.72 2	45.327	10	52.00 129	52.522	23	71.87 20
35.4	49.734	27		53.051			45.279	48	53.29	52.503	19	72.07
Mean Place	44.381		35.51	47.139		21.96	37.844		31.39	46.378		55.08
Ser δ, Tan δ	1.005		+0.101	1.077		+0.401	1.480		+1.091	1.115		+0.494
Dψ α, Dω α	+0.06		0.00	+0.07		-0.01	+0.09		-0.04	+0.07		-0.02
Dψ δ, Dω δ	+0.2		+0.9	+0.2		+0.9	+0.2		+0.9	+0.2		+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Eridani. Mag. 4.1		♉ Tauri. Mag. 4.3		♏ Horologii. Mag. 3.8		♈ Reticuli. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 7 s	° ' " - 7 2 "	h m 4 11 s	° ' " + 8 41 "	h m 4 11 s	° ' " -42 29 "	h m 4 13 s	° ' " -62 40 "
Jan. 0.4	50.851	68.69	3.707	13.26	17.286	59.52	23.87	58.91
10.4	50.801 50	70.00 131	3.667 40	12.60 66	17.150 136	61.84 232	23.57 30	61.38 247
20.3	50.715 86	71.13 113	3.594 73	11.99 61	16.972 178	63.75 191	23.20 37	63.36 198
30.3	50.598 117	72.07 94	3.488 106	11.43 56	16.757 215	65.21 146	22.79 41	64.83 147
Feb. 9.3	50.457 141	72.79 72	3.355 133	10.93 50	16.514 243	66.19 98	22.33 46	65.73 90
	161	50	153	42	263	47	48	34
19.3	50.296	73.29	3.202	10.51	16.251	66.66	21.85	66.07
Mar. 1.2	50.127 169	73.55 28	3.038 164	10.16 35	15.980 271	66.63 3	21.36 49	65.84 28
11.2	49.958 169	73.58 3	2.875 163	9.88 28	15.711 269	66.11 52	20.88 48	65.06 78
21.2	49.799 159	73.36 22	2.721 154	9.71 17	15.455 256	65.11 100	20.42 46	63.76 130
31.2	49.658 141	72.91 45	2.585 136	9.64 7	15.222 233	63.66 145	19.99 43	61.97 179
	112	70	107	5	199	184	38	222
Apr. 10.1	49.546	72.21	2.478	9.69	15.023	61.82	19.61	59.75
20.1	49.468 78	71.28 93	2.406 72	9.89 20	14.865 158	59.59 223	19.29 32	57.14 261
30.1	49.430 38	70.11 117	2.375 31	10.23 34	14.755 110	57.03 256	19.06 23	54.19 295
May 10.0	49.435 5	68.75 136	2.388 13	10.73 50	14.697 58	54.22 281	18.89 17	51.00 319
20.0	49.485 50	67.19 156	2.447 59	11.40 67	14.696 1	51.20 302	18.80 9	47.62 338
	94	172	105	82	54	315	0	349
30.0	49.579	65.47	2.552	12.22	14.750	48.05	18.80	44.13
June 9.0	49.717 138	63.63 184	2.699 147	13.19 97	14.859 109	44.85 320	18.88 8	40.62 351
18.9	49.894 177	61.72 191	2.885 186	14.28 109	15.020 161	41.66 319	19.05 17	37.17 345
28.9	50.106 212	59.77 195	3.107 222	15.48 120	15.230 210	38.59 307	19.30 25	33.87 330
July 8.9	50.346 240	57.84 193	3.358 251	16.74 126	15.482 252	35.70 289	19.62 32	30.83 304
	264	184	273	127	287	262	38	272
18.9	50.610	56.00	3.631	18.01	15.769	33.08	20.00	28.11
28.8	50.890 280	54.30 170	3.920 289	19.27 126	16.085 316	30.81 227	20.42 42	25.80 231
Aug. 7.8	51.181 291	52.79 151	4.219 299	20.46 119	16.421 336	28.97 184	20.89 47	23.98 182
17.8	51.477 296	51.53 126	4.524 305	21.56 110	16.770 349	27.61 136	21.39 50	22.71 127
27.7	51.771 294	50.55 98	4.827 303	22.52 96	17.123 353	26.79 82	21.90 51	22.04 67
	289	64	297	78	348	25	51	4
Sept. 6.7	52.060	49.91	5.124	23.30	17.471	26.54	22.41	22.00
16.7	52.339 279	49.61 30	5.411 287	23.89 59	17.808 337	26.87 33	22.90 49	22.59 59
26.7	52.602 263	49.65 4	5.685 274	24.26 37	18.127 319	27.79 92	23.37 47	23.80 121
Oct. 6.6	52.849 247	50.05 40	5.941 256	24.41 15	18.421 294	29.25 146	23.80 43	25.60 180
16.6	53.076 227	50.77 72	6.179 238	24.36 5	18.684 263	31.21 196	24.17 37	27.94 234
	202	100	214	25	225	239	30	279
26.6	53.278	51.77	6.393	24.11	18.909	33.60	24.47	30.73
Nov. 5.6	53.454 176	53.03 126	6.584 191	23.70 41	19.095 186	36.34 274	24.71 24	33.87 314
15.5	53.602 148	54.45 142	6.745 161	23.16 54	19.235 140	39.33 299	24.86 15	37.23 336
25.5	53.717 115	56.00 155	6.876 131	22.53 63	19.326 91	42.44 311	24.94 8	40.73 350
Dec. 5.5	53.798 81	57.60 160	6.974 98	21.83 70	19.368 42	45.57 313	24.93 1	44.19 346
	46	159	61	72	10	302	10	333
15.4	53.844	59.19	7.035	21.11	19.358	48.59	24.83	47.52
25.4	53.852 8	60.72 153	7.058 23	20.38 73	19.298 60	51.43 284	24.65 18	50.60 308
35.4	53.821 31	62.14 142	7.042 16	19.67 71	19.189 109	53.98 255	24.37 28	53.34 274
Mean Place	48.789	71.25	1.544	7.40	15.072	55.70	21.071	53.00
Sec δ, Tan δ	1.008	-0.124	1.012	+0.153	1.356	-0.916	2.179	-1.936
Dψ α, Dω α	+0.06	0.00	+0.06	0.00	+0.04	+0.03	+0.02	+0.06
Dψ δ, Dω δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tauri. Mag. 3.9		δ Tauri. Mag. 3.9		υ <sup>s</sup> Eridani. Mag. 4.1		δ Mensæ. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 15 s	° ' +15 25 "	h m 4 18 s	° ' +17 20 "	h m 4 20 s	° ' -34 12 "	h m 4 23 s	° ' -80 24 "
Jan. 0.4	6.319	48.46	11.035	63.11	57.291	34.94	38.89	39.97
10.4	6.287 32	48.11 35	11.005 30	62.86 25	57.197 94	37.19 225	37.87 102	42.38 241
20.3	6.216 71	47.76 35	10.935 70	62.59 27	57.062 135	39.08 189	36.67 120	44.32 194
30.3	6.111 105	47.40 36	10.830 105	62.30 29	56.890 172	40.57 149	35.35 132	45.74 142
Feb. 9.3	5.977 134	47.04 36	10.696 134	61.99 31	56.689 201	41.62 105	33.93 142	46.60 86
	155	37	156	34	220	60	147	31
19.3	5.822	46.67	10.540	61.65	56.469	42.22 15	32.46	46.91
Mar. 1.2	5.656 166	46.31 36	10.371 169	61.29 36	56.237 232	42.37 30	30.96 150	46.67 24
11.2	5.488 168	45.95 36	10.201 170	60.92 37	56.005 232	42.07 75	29.49 147	45.86 81
21.2	5.330 158	45.62 33	10.040 161	60.55 37	55.782 223	41.32 116	28.06 143	44.55 131
31.2	5.190 140	45.34 28	9.898 142	60.21 34	55.579 203	40.16 156	26.73 133	42.78 177
	110	21	113	29	175	156	120	222
Apr. 10.1	5.080	45.13 13	9.785 77	59.92 21	55.404 137	38.60 191	25.53 105	40.56 258
20.1	5.006 33	45.00 1	9.708 35	59.71 12	55.267 95	36.69 223	24.48 88	37.98 287
30.1	4.973 12	44.99 11	9.673 11	59.59 1	55.172 46	34.46 251	23.60 69	35.11 315
May 10.0	4.985 60	45.10 27	9.684 58	59.60 14	55.126 4	31.95 271	22.91 49	31.96 331
20.0	5.045 106	45.37 41	9.742 105	59.74 30	55.130 54	29.24 286	22.42 27	28.65 340
30.0	5.151	45.78	9.847	60.04	55.184	26.38	22.15 2	25.25 342
June 9.0	5.302 151	46.35 57	9.997 150	60.48 44	55.288 104	23.42 296	22.13 19	21.83 336
18.9	5.494 192	47.06 71	10.187 190	61.07 59	55.440 152	20.45 297	22.32 40	18.47 319
28.9	5.721 227	47.88 82	10.414 227	61.79 72	55.635 195	17.54 291	22.72 61	15.28 299
July 8.9	5.978 257	48.81 93	10.672 258	62.61 82	55.867 232	14.77 277	23.33 80	12.29 260
	279	100	280	90	266	253		
18.9	6.257	49.81 102	10.952	63.51 95	56.133	12.24 224	24.13 95	9.69 221
28.8	6.554 297	50.83 103	11.251 299	64.46 96	56.423 290	10.00 188	25.08 110	7.48 174
Aug. 7.8	6.863 309	51.86 99	11.561 310	65.42 94	56.733 310	8.12 143	26.18 120	5.74 119
17.8	7.175 312	52.85 91	11.876 315	66.36 88	57.054 321	6.69 94	27.38 125	4.55 62
27.7	7.487 305	53.76 81	12.191 310	67.24 80	57.379 323	5.75 42	28.63 128	3.93 1
Sept. 6.7	7.792	54.57 66	12.501 300	68.04 67	57.702 313	5.33 12	29.91 125	3.94 63
16.7	8.090 288	55.23 52	12.801 289	68.71 55	58.015 299	5.45 66	31.16 119	4.57 125
26.7	8.374 267	55.75 38	13.090 273	69.26 42	58.314 279	6.11 119	32.35 108	5.82 182
Oct. 6.6	8.641 248	56.13 21	13.363 253	69.68 27	58.593 253	7.30 168	33.43 94	7.64 236
16.6	8.889 227	56.34 8	13.616 232	69.95 16	58.846 222	8.98 210	34.37 75	10.00 278
26.6	9.116	56.42 6	13.848	70.11 4	59.068	11.08 245	35.12 54	12.78 314
Nov. 5.6	9.317 173	56.36 14	14.055 179	70.15 5	59.258 151	13.53 270	35.66 30	15.92 336
15.5	9.490 142	56.22 25	14.234 147	70.10 12	59.409 110	16.23 284	35.96 6	19.28 345
25.5	9.632 107	55.97 29	14.381 113	69.98 18	59.519 66	19.07 290	36.02 20	22.73 346
Dec. 5.5	9.739 70	55.68 32	14.494 74	69.80 21	59.585 21	21.97 284	35.82 44	26.19 329
15.4	9.809 30	55.36 35	14.568 33	69.59 25	59.606 25	24.81 269	35.38 69	29.48 306
25.4	9.839 10	55.01 36	14.601 7	69.34 26	59.581 71	27.50 244	34.69 90	32.54 271
35.4	9.829	54.65	14.594	69.08	59.510	29.94	33.79	35.25
Mean Place	4.077	41.32	8.755	55.71	55.139	32.57	32.981	33.81
Sec δ, Tan δ	1.037	+0.276	1.048	+0.312	1.209	-0.680	6.001	-5.917
Dψ α, Dω α	+0.07	-0.01	+0.07	-0.01	+0.04	+0.02	-0.08	+0.16
Dψ δ, Dω δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Tauri. Mag. 3.6		$m$ Persel. Mag. 6.1		$\alpha$ Tauri. (Aldebaran.) Mag. 1.1		$\nu$ Eridani. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 23 s 48.409	° ' +18 59 " 57.91	h m 4 27 s 37.138	° ' +42 53 " 27.48	h m 4 31 s 11.674	° ' +16 20 " 42.95	h m 4 32 s 12.385	° ' - 3 30 " 73.50
Jan. 0.4	48.409	57.91	37.138	27.48	11.674	42.95	12.385	73.50
10.4	48.383 26	57.74 17	37.099 39	28.52 104	11.655 19	42.65 30	12.355 30	74.76 126
20.4	48.317 66	57.55 19	37.006 93	29.38 86	11.594 61	42.34 31	12.287 68	75.86 110
30.3	48.214 103	57.31 24	36.865 141	29.99 61	11.497 97	42.03 31	12.186 101	76.80 94
Feb. 9.3	48.081 133	57.05 26	36.684 181	30.34 35	11.367 130	41.71 32	12.054 132	77.55 75
	156	30	210	8	152	32	154	56
19.3	47.925	56.75	36.474	30.42	11.215	41.39	11.900	78.11
Mar. 1.2	47.754 171	56.40 35	36.248 226	30.20 22	11.046 169	41.06 33	11.731 169	78.47 36
11.2	47.581 173	56.03 37	36.018 230	29.71 49	10.874 172	40.73 33	11.560 171	78.61 14
21.2	47.417 104	55.65 38	35.799 219	28.94 77	10.710 164	40.41 32	11.395 165	78.55 6
31.2	47.271 146	55.28 37	35.603 196	27.96 98	10.561 149	40.12 29	11.244 151	78.27 28
	118	35	160	117	121	22	125	48
Apr. 10.1	47.153	54.93	35.443	26.79	10.440	39.90	11.119	77.79
20.1	47.071 82	54.64 29	35.329 114	25.51 128	10.353 87	39.73 17	11.025 94	77.08 71
30.1	47.031 40	54.45 19	35.268 61	24.16 135	10.306 47	39.66 7	10.969 56	76.18 90
May 10.1	47.037 6	54.36 9	35.267 1	22.79 137	10.305 1	39.70 4	10.956 13	75.07 111
20.0	47.090 53	54.40 4	35.325 58	21.47 132	10.350 45	39.88 18	10.987 31	73.78 129
	101	18	118	121	91	32	76	145
30.0	47.191	54.58	35.443	20.26	10.441	40.20	11.063	72.33
June 9.0	47.338 147	54.91 33	35.618 175	19.18 108	10.578 137	40.65 45	11.181 118	70.75 158
18.9	47.525 187	55.37 46	35.846 228	18.28 90	10.756 178	41.23 58	11.339 158	69.06 160
28.9	47.750 225	55.97 60	36.122 276	17.58 70	10.971 215	41.94 71	11.532 193	67.34 172
July 8.9	48.006 256	56.69 72	36.438 316	17.09 49	11.217 246	42.74 80	11.757 225	65.61 173
	280	80	348	26	271	87	251	167
18.9	48.286	57.49	36.786	16.83	11.488	43.61	12.008	63.94
28.8	48.586 300	58.35 86	37.159 373	16.79 4	11.778 290	44.51 90	12.277 269	62.37 157
Aug. 7.8	48.896 310	59.23 88	37.549 390	16.97 18	12.082 304	45.42 91	12.560 283	60.95 142
17.8	49.213 317	60.10 87	37.949 400	17.34 37	12.392 310	46.29 87	12.851 291	59.74 121
27.8	49.531 318	60.94 84	38.351 402	17.89 55	12.705 313	47.10 81	13.144 293	58.78 96
	314	76	397	73	310	70	292	66
Sept. 6.7	49.845	61.70	38.748	18.62	13.015	47.80	13.436	58.12
16.7	50.150 305	62.36 66	39.138 390	19.49 87	13.317 302	48.39 59	13.721 285	57.77 35
26.7	50.444 294	62.91 55	39.515 377	20.48 99	13.609 292	48.84 45	13.994 273	57.74 3
Oct. 6.6	50.723 279	63.35 44	39.872 357	21.58 110	13.887 278	49.15 31	14.254 260	58.04 30
16.6	50.983 260	63.67 32	40.208 336	22.77 119	14.148 261	49.31 16	14.498 244	58.65 61
	239	20	309	126	241	3	224	88
26.6	51.222	63.87	40.517	24.03	14.389	49.34	14.722	59.53
Nov. 5.6	51.436 214	63.97 10	40.794 277	25.36 133	14.606 217	49.26 8	14.921 199	60.65 112
15.5	51.624 188	63.99 2	41.034 240	26.72 136	14.797 191	49.09 17	15.093 172	61.94 129
25.5	51.778 154	63.95 4	41.232 198	28.10 138	14.956 159	48.85 24	15.236 143	63.36 142
Dec. 5.5	51.897 119	63.86 9	41.383 151	29.47 137	15.080 124	48.56 29	15.344 108	64.84 148
	81	12	100	133	86	31	71	149
15.5	51.978	63.74	41.483	30.80	15.166	48.25	15.415	66.33
25.4	52.018 40	63.59 15	41.528 45	32.05 125	15.213 47	47.93 32	15.447 32	67.78 145
35.4	52.015 3	63.42 17	41.519 9	33.17 112	15.216 3	47.61 32	15.440 7	69.12 134
Mean Place	46.086	50.43	34.256	15.99	9.358	36.31	10.231	76.42
Sec $\delta$ , Tan $\delta$	1.058	+0.344	1.365	+0.929	1.042	+0.293	1.002	-0.061
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.07	-0.01	+0.08	-0.02	+0.07	-0.01	+0.06	0.00
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Doradus. Mag. 3.5		53 Eridani. Mag. 4.0		$\tau$ Tauri. Mag. 4.3		Groombridge 848. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 32 s	° ' -55 12 "	h m 4 34 s	° ' -14 27 "	h m 4 37 s	° ' +22 47 "	h m 4 37 s	° ' +75 47 "
Jan. 0.4	14.670	63.39	24.776	54.47	18.124	62.86	45.55	46.56
10.4	14.475 <sup>195</sup>	66.05 <sup>266</sup>	24.736 <sup>40</sup>	56.19 <sup>172</sup>	18.110 <sup>14</sup>	62.89 <sup>3</sup>	45.29 <sup>26</sup>	49.08 <sup>252</sup>
20.4	14.223 <sup>252</sup>	68.27 <sup>222</sup>	24.656 <sup>80</sup>	57.69 <sup>150</sup>	18.051 <sup>59</sup>	62.88 <sup>1</sup>	44.88 <sup>41</sup>	51.26 <sup>218</sup>
30.3	13.922 <sup>301</sup>	70.01 <sup>174</sup>	24.541 <sup>115</sup>	58.93 <sup>124</sup>	17.954 <sup>97</sup>	62.81 <sup>7</sup>	44.33 <sup>55</sup>	53.03 <sup>177</sup>
Feb. 9.3	13.583 <sup>339</sup>	71.24 <sup>123</sup>	24.397 <sup>144</sup>	59.90 <sup>97</sup>	17.822 <sup>132</sup>	62.68 <sup>13</sup>	43.68 <sup>65</sup>	54.31 <sup>128</sup>
	366	67	167	66	159	21	75	75
19.3	13.217	71.91	24.230	60.56	17.663	62.47	42.93	55.06
Mar. 1.3	12.836 <sup>381</sup>	72.04 <sup>13</sup>	24.050 <sup>180</sup>	60.92 <sup>36</sup>	17.489 <sup>174</sup>	62.20 <sup>27</sup>	42.15 <sup>78</sup>	55.24 <sup>18</sup>
11.2	12.454 <sup>382</sup>	71.63 <sup>41</sup>	23.865 <sup>185</sup>	60.97 <sup>5</sup>	17.310 <sup>179</sup>	61.86 <sup>34</sup>	41.36 <sup>79</sup>	54.86 <sup>38</sup>
21.2	12.084 <sup>370</sup>	70.68 <sup>95</sup>	23.687 <sup>178</sup>	60.71 <sup>26</sup>	17.136 <sup>174</sup>	61.46 <sup>40</sup>	40.60 <sup>76</sup>	53.94 <sup>92</sup>
31.2	11.740 <sup>344</sup>	69.24 <sup>144</sup>	23.524 <sup>163</sup>	60.16 <sup>55</sup>	16.980 <sup>156</sup>	61.02 <sup>44</sup>	39.92 <sup>68</sup>	52.50 <sup>144</sup>
	307	188	140	85	130	45	60	185
Apr. 10.1	11.433	67.36	23.384	59.31	16.850	60.57	39.32	50.65
20.1	11.172 <sup>261</sup>	65.05 <sup>231</sup>	23.278 <sup>106</sup>	58.18 <sup>113</sup>	16.755 <sup>95</sup>	60.14 <sup>43</sup>	38.85 <sup>47</sup>	48.42 <sup>223</sup>
30.1	10.967 <sup>205</sup>	62.39 <sup>266</sup>	23.210 <sup>68</sup>	56.79 <sup>139</sup>	16.703 <sup>52</sup>	59.75 <sup>39</sup>	38.53 <sup>32</sup>	45.92 <sup>250</sup>
May 10.1	10.826 <sup>141</sup>	59.43 <sup>296</sup>	23.183 <sup>27</sup>	55.16 <sup>163</sup>	16.697 <sup>6</sup>	59.45 <sup>30</sup>	38.37 <sup>16</sup>	43.26 <sup>266</sup>
20.0	10.751 <sup>75</sup>	56.25 <sup>318</sup>	23.201 <sup>18</sup>	53.33 <sup>183</sup>	16.739 <sup>42</sup>	59.26 <sup>19</sup>	38.37 <sup>0</sup>	40.50 <sup>276</sup>
	5	334	64	199	90	9	18	275
30.0	10.746	52.91	23.265	51.34	16.829	59.17	38.55	37.75
June 9.0	10.809 <sup>63</sup>	49.50 <sup>341</sup>	23.372 <sup>107</sup>	49.21 <sup>213</sup>	16.966 <sup>137</sup>	59.23 <sup>6</sup>	38.88 <sup>33</sup>	35.09 <sup>266</sup>
19.0	10.941 <sup>132</sup>	46.10 <sup>340</sup>	23.520 <sup>148</sup>	47.00 <sup>221</sup>	17.147 <sup>181</sup>	59.43 <sup>20</sup>	39.36 <sup>48</sup>	32.60 <sup>249</sup>
28.9	11.138 <sup>197</sup>	42.80 <sup>330</sup>	23.705 <sup>185</sup>	44.79 <sup>221</sup>	17.366 <sup>219</sup>	59.75 <sup>32</sup>	39.99 <sup>63</sup>	30.34 <sup>226</sup>
July 8.9	11.392 <sup>254</sup>	39.70 <sup>310</sup>	23.923 <sup>218</sup>	42.62 <sup>217</sup>	17.618 <sup>252</sup>	60.19 <sup>44</sup>	40.75 <sup>76</sup>	28.37 <sup>197</sup>
	306	284	244	205	278	55	86	162
18.9	11.698	36.86	24.167	40.57	17.896	60.74	41.61	26.75
28.8	12.049 <sup>351</sup>	34.40 <sup>246</sup>	24.434 <sup>267</sup>	38.69 <sup>188</sup>	18.196 <sup>300</sup>	61.37 <sup>63</sup>	42.55 <sup>94</sup>	25.50 <sup>125</sup>
Aug. 7.8	12.433 <sup>384</sup>	32.38 <sup>202</sup>	24.715 <sup>281</sup>	37.06 <sup>163</sup>	18.509 <sup>313</sup>	62.06 <sup>69</sup>	43.56 <sup>101</sup>	24.64 <sup>86</sup>
17.8	12.842 <sup>409</sup>	30.88 <sup>150</sup>	25.006 <sup>291</sup>	35.70 <sup>136</sup>	18.830 <sup>321</sup>	62.76 <sup>70</sup>	44.62 <sup>106</sup>	24.19 <sup>45</sup>
27.8	13.266 <sup>424</sup>	29.95 <sup>93</sup>	25.301 <sup>295</sup>	34.70 <sup>100</sup>	19.155 <sup>325</sup>	63.46 <sup>70</sup>	45.71 <sup>109</sup>	24.16 <sup>3</sup>
	427	33	293	61	323	67	109	39
Sept. 6.7	13.693	29.62	25.594	34.09	19.478	64.13	46.80	24.55
16.7	14.114 <sup>421</sup>	29.91 <sup>29</sup>	25.882 <sup>288</sup>	33.88 <sup>21</sup>	19.795 <sup>317</sup>	64.75 <sup>62</sup>	47.88 <sup>108</sup>	25.35 <sup>80</sup>
26.7	14.516 <sup>402</sup>	30.85 <sup>94</sup>	26.158 <sup>276</sup>	34.09 <sup>21</sup>	20.101 <sup>306</sup>	65.29 <sup>54</sup>	48.94 <sup>106</sup>	26.55 <sup>120</sup>
Oct. 6.7	14.891 <sup>375</sup>	32.38 <sup>153</sup>	26.419 <sup>261</sup>	34.72 <sup>63</sup>	20.395 <sup>294</sup>	65.76 <sup>47</sup>	49.94 <sup>100</sup>	28.12 <sup>157</sup>
16.6	15.228 <sup>337</sup>	34.46 <sup>208</sup>	26.664 <sup>245</sup>	35.73 <sup>101</sup>	20.672 <sup>277</sup>	66.14 <sup>38</sup>	50.88 <sup>94</sup>	30.03 <sup>191</sup>
	292	257	223	134	256	30	85	223
26.6	15.520	37.03	26.887	37.07	20.928	66.44	51.73	32.26
Nov. 5.6	15.757 <sup>237</sup>	40.00 <sup>297</sup>	27.084 <sup>197</sup>	38.72 <sup>165</sup>	21.161 <sup>233</sup>	66.67 <sup>23</sup>	52.47 <sup>74</sup>	34.76 <sup>250</sup>
15.5	15.936 <sup>179</sup>	43.24 <sup>324</sup>	27.252 <sup>168</sup>	40.59 <sup>187</sup>	21.366 <sup>205</sup>	66.85 <sup>18</sup>	53.11 <sup>64</sup>	37.48 <sup>272</sup>
25.5	16.050 <sup>114</sup>	46.65 <sup>341</sup>	27.389 <sup>137</sup>	42.60 <sup>201</sup>	21.539 <sup>173</sup>	66.99 <sup>14</sup>	53.60 <sup>49</sup>	40.35 <sup>287</sup>
Dec. 5.5	16.096 <sup>46</sup>	50.11 <sup>346</sup>	27.490 <sup>101</sup>	44.68 <sup>208</sup>	21.677 <sup>138</sup>	67.09 <sup>10</sup>	53.94 <sup>34</sup>	43.30 <sup>295</sup>
	23	338	63	208	97	9	17	295
15.5	16.073	53.49	27.553	46.76	21.774	67.18	54.11	46.25
25.4	15.980 <sup>93</sup>	56.69 <sup>320</sup>	27.575 <sup>22</sup>	48.76 <sup>200</sup>	21.828 <sup>54</sup>	67.24 <sup>6</sup>	54.12 <sup>1</sup>	49.11 <sup>286</sup>
35.4	15.822 <sup>158</sup>	59.58 <sup>289</sup>	27.556 <sup>19</sup>	50.62 <sup>186</sup>	21.838 <sup>10</sup>	67.27 <sup>3</sup>	53.97 <sup>15</sup>	51.79 <sup>268</sup>
Mean Place	12.109	58.87	22.647	55.42	15.692	55.34	38.363	32.16
Sec $\delta$ , Tan $\delta$	1.753	-1.440	1.033	-0.258	1.085	+0.420	4.075	+3.951
$D_{\psi} a$ , $D_{\omega} a$	+0.03	+0.03	+0.05	+0.01	+0.07	-0.01	+0.16	-0.08
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Coell. Mag. 4.5		4 Camelop. Mag. 5.4		$\mu$ Eridani. Mag. 4.2		$\pi^3$ Orionis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 37 s	° ' -42 0 "	h m 4 41 s	° ' +56 36 "	h m 4 41 s	° ' - 3 24 "	h m 4 45 s	° ' + 6 49 "
Jan. 0.4	55.410	82.29	8.713	52.63	23.270	18.33	22.242	7.15
10.4	55.301 109	84.84 255	8.655 58	54.39 176	23.249 21	19.61 128	22.232 10	6.35 80
20.4	55.144 157	87.02 218	8.525 130	55.89 150	23.187 62	20.75 114	22.182 50	5.63 72
30.3	54.946 198	88.77 175	8.329 196	57.08 119	23.090 97	21.72 97	22.093 89	5.00 63
Feb. 9.3	54.715 231	90.05 128	8.079 250	57.92 84	22.962 128	22.48 76	21.972 121	4.45 55
	257	79	292	44	152	59	146	44
19.3	54.458	90.84	7.787	58.36	22.810	23.07	21.826	4.01
Mar. 1.3	54.187 271	91.13 29	7.471 316	58.40 4	22.642 168	23.44 37	21.663 163	3.67 34
11.2	53.912 275	90.92 21	7.147 324	58.01 39	22.470 172	23.61 17	21.495 168	3.43 24
21.2	53.645 267	90.23 69	6.836 311	57.23 78	22.303 167	23.58 3	21.331 164	3.30 13
31.2	53.397 248	89.08 115	6.551 285	56.08 115	22.149 154	23.32 26	21.179 152	3.29 1
	221	159	240	145	131	45	127	10
Apr. 10.1	53.176 183	87.49 197	6.311 182	54.63 170	22.018 101	22.87 68	21.052 97	3.39 26
20.1	52.993 138	85.52 232	6.129 115	52.93 187	21.917 62	22.19 87	20.955 59	3.65 39
30.1	52.855 88	83.20 263	6.014 41	51.06 197	21.855 22	21.32 107	20.896 17	4.04 54
May 10.1	52.767 35	80.57 287	5.973 38	49.09 200	21.833 22	20.25 126	20.879 27	4.58 70
20.0	52.732 21	77.70 305	6.011 115	47.09 196	21.855 68	18.99 141	20.906 72	5.28 83
30.0	52.753 76	74.65 313	6.126 191	45.13 185	21.923 110	17.58 154	20.978 115	6.11 97
June 9.0	52.829 129	71.52 316	6.317 260	43.28 169	22.033 150	16.04 165	21.093 156	7.08 107
19.0	52.958 178	68.36 311	6.577 326	41.59 149	22.183 186	14.39 170	21.249 192	8.15 117
28.9	53.136 222	65.25 295	6.903 380	40.10 124	22.369 218	12.69 171	21.441 225	9.32 120
July 8.9	53.358 262	62.30 273	7.283 426	38.86 98	22.587 244	10.98 164	21.666 250	10.52 122
18.9	53.620 294	59.57 241	7.709 462	37.88 68	22.831 265	9.34 155	21.916 271	11.74 119
28.8	53.914 319	57.16 201	8.171 491	37.20 40	23.096 279	7.79 140	22.187 286	12.93 111
Aug. 7.8	54.233 336	55.15 156	8.662 508	36.80 10	23.375 289	6.39 119	22.473 295	14.04 100
17.8	54.569 345	53.59 105	9.170 517	36.70 20	23.664 292	5.20 96	22.768 299	15.04 84
27.8	54.914 348	52.54 48	9.687 518	36.90 47	23.956 292	4.24 65	23.067 298	15.88 65
Sept. 6.7	55.262 343	52.06 10	10.205 512	37.37 75	24.248 287	3.59 34	23.365 294	16.53 44
16.7	55.605 331	52.16 69	10.717 497	38.12 99	24.535 278	3.25 3	23.659 286	16.97 20
26.7	55.936 310	52.85 126	11.214 477	39.11 124	24.813 265	3.22 30	23.945 274	17.17 2
Oct. 6.7	56.246 284	54.11 180	11.691 450	40.35 145	25.078 249	3.52 62	24.219 258	17.15 26
16.6	56.530 252	55.91 227	12.141 415	41.80 165	25.327 230	4.14 89	24.477 241	16.89 45
26.6	56.782 214	58.18 265	12.556 374	43.45 181	25.557 206	5.03 113	24.718 218	16.44 63
Nov. 5.6	56.996 173	60.83 295	12.930 325	45.26 194	25.763 181	6.16 131	24.936 194	15.81 77
15.5	57.169 126	63.78 314	13.255 268	47.20 203	25.944 150	7.47 144	25.130 163	15.04 86
25.5	57.295 76	66.92 320	13.523 205	49.23 209	26.094 117	8.91 150	25.293 130	14.18 92
Dec. 5.5	57.371 25	70.12 315	13.728 134	51.32 207	26.211 80	10.41 152	25.423 94	13.26 93
15.5	57.396 28	73.27 300	13.862 61	53.39 200	26.291 41	11.93 147	25.517 54	12.33 90
25.4	57.368 80	76.27 277	13.923 16	55.39 186	26.332 1	13.40 137	25.571 12	11.43 86
35.4	57.288	79.04	13.907	57.25	26.333	14.77	25.583	10.57
Mean Place	53.125	79.29	5.010	40.34	21.091	21.10	19.982	2.75
Sec $\delta$ , Tan $\delta$	1.346	-0.901	1.817	+1.517	1.002	-0.059	1.007	+0.120
$D_{\mu} \alpha$ , $D_{\mu} \delta$	+0.04	+0.02	+0.10	-0.03	+0.06	0.00	+0.06	0.00
$n_{\mu} \delta$ , $D_{\mu} \delta$	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	9 Camelop. Mag. 4.4			ι Tauri. Mag. 5.1			π <sup>5</sup> Orionis. Mag. 3.9			ι Aurigæ. Mag. 2.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	4	45	+66 12	4	46	+18 41	4	49	+ 2 18	4	51	+33 2
	s		"	s		"	s		"	s		"
Jan. 0.4	52.24		25.12	33.414		64.99	57.867		24.34	37.855		17.20
10.4	52.13	11	27.32 220	33.408	6	64.80 19	57.856	11	23.30 104	37.851	4	17.79 50
20.4	51.93	20	29.24 192	33.358	50	64.60 20	57.806	50	22.37 93	37.796	55	18.29 50
30.3	51.65	28	30.80 156	33.268	90	64.40 20	57.717	89	21.57 80	37.696	100	18.67 38
Feb. 9.3	51.29	36	31.94 114	33.142	126	64.18 22	57.595	122	20.92 65	37.557	139	18.89 22
		42			150			147			172	
19.3	50.87		32.62	32.992		63.94	57.448		20.39	37.385		18.96
Mar. 1.3	50.42	45	32.81 19	32.824	168	63.66 28	57.284	164	20.02 37	37.193	192	18.85 11
11.2	49.96	46	32.50 31	32.648	176	63.37 29	57.113	171	19.80 22	36.993	200	18.54 31
21.2	49.52	44	31.72 78	32.475	173	63.06 31	56.946	167	19.73 7	36.797	196	18.08 46
31.2	49.11	41	30.49 123	32.320	155	62.75 31	56.791	155	19.82 9	36.616	181	17.48 60
		35			132			133			153	
Apr. 10.2	48.76		28.87	32.188		62.46	56.658		20.08	36.463		16.75
20.1	48.48	28	26.95 192	32.088	100	62.23 23	56.556	102	20.49 41	36.347	116	15.95 80
30.1	48.29	19	24.78 217	32.030	58	62.05 18	56.491	65	21.08 59	36.276	71	15.11 84
May 10.1	48.21	8	22.46 232	32.015	15	61.97 8	56.467	24	21.85 77	36.254	22	14.28 83
20.0	48.22	1	20.06 240	32.046	81	61.99 2	56.487	20	22.78 93	36.283	29	13.49 79
		12			79			64			83	
30.0	48.34		17.67	32.125		62.14	56.551		23.85	36.366		12.79
June 9.0	48.55	21	15.36 231	32.249	124	62.40 26	56.658	107	25.07 122	36.500	134	12.19 60
19.0	48.88	33	13.21 215	32.414	165	62.79 39	56.805	147	26.38 131	36.681	181	11.72 47
28.9	49.28	40	11.26 195	32.619	205	63.30 51	56.988	183	27.76 138	36.906	225	11.40 32
July 8.9	49.75	47	9.57 169	32.856	237	63.88 58	57.204	216	29.17 141	37.168	262	11.24 16
		55			264			241			293	
18.9	50.30		8.17	33.120		64.59	57.445		30.57	37.461		11.21
28.9	50.90	60	7.11 106	33.406	286	65.32 73	57.709	264	31.91 134	37.778	317	11.33 12
Aug. 7.8	51.53	63	6.39 72	33.707	301	66.06 74	57.987	278	33.13 122	38.113	335	11.58 25
17.8	52.20	67	6.02 37	34.018	311	66.79 73	58.276	289	34.22 109	38.460	347	11.92 34
27.8	52.88	68	6.00 2	34.332	314	67.47 68	58.569	298	35.10 88	38.814	354	12.36 44
		69			314			294			353	
Sept. 6.7	53.57		6.34	34.646		68.09	58.863		35.74	39.167		12.86
16.7	54.25	68	7.03 69	34.957	311	68.60 51	59.154	291	36.13 39	39.516	349	13.41 55
26.7	54.92	67	8.05 102	35.260	303	69.02 42	59.436	282	36.23 10	39.858	342	14.00 59
Oct. 6.7	55.56	64	9.38 133	35.550	290	69.31 29	59.708	272	36.06 17	40.188	330	14.61 61
16.6	56.17	61	11.01 163	35.824	274	69.49 18	59.965	257	35.64 42	40.502	314	15.23 62
		55			259			240			294	
26.6	56.72		12.89	36.083		69.54	60.205		34.97	40.796		15.88
Nov. 5.6	57.22	50	15.02 213	36.316	283	69.51 3	60.422	217	34.10 87	41.065	269	16.54 66
15.5	57.65	43	17.33 231	36.523	207	69.41 10	60.615	193	33.07 103	41.305	240	17.21 67
25.5	58.01	36	19.78 245	36.702	179	69.25 16	60.778	163	31.94 113	41.510	205	17.89 68
Dec. 5.5	58.26	25	22.31 253	36.844	142	69.08 17	60.908	130	30.73 121	41.676	166	18.58 69
		16			104			94			122	
15.5	58.42		24.85	36.948		68.88	61.002		29.51	41.798		19.27
25.4	58.49	7	27.32 247	37.010	62	68.68 20	61.056	54	28.34 117	41.872	74	19.93 66
35.4	58.45	4	29.64 232	37.028	18	68.47 21	61.069	13	27.24 110	41.895	23	20.55 62
Mean Place	47.437		12.27	31.010		58.61	55.628		20.81	35.156		8.90
Sec δ, Tan δ	2.478		+2.268	1.056		+0.338	1.001		+0.040	1.193		+0.650
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.12		-0.05	+0.07		-0.01	+0.06		0.00	+0.08		-0.01
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.1		+0.9	+0.1		+0.9	+0.1		+1.0	+0.1		+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Aurigæ. Var. 3.0-4.5		$\beta$ Camelop. Mag. 4.2		$\zeta$ Aurigæ. Mag. 3.9		$\iota$ Tauri. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 56 s	° ' " +43 42 "	h m 4 56 s	° ' " +60 19 "	h m 4 56 s	° ' " +40 57 "	h m 4 58 s	° ' " +21 28 "
Jan. 0.4	3.684	15.55	5.82	32.43	43.363	30.47	10.491	26.63
10.4	3.676 <sup>8</sup>	16.72 <sup>117</sup>	5.77 <sup>5</sup>	34.41 <sup>198</sup>	43.357 <sup>6</sup>	31.49 <sup>102</sup>	10.496 <sup>5</sup>	26.59 <sup>4</sup>
20.4	3.609 <sup>67</sup>	17.74 <sup>102</sup>	5.64 <sup>13</sup>	36.16 <sup>175</sup>	43.297 <sup>60</sup>	32.38 <sup>89</sup>	10.454 <sup>42</sup>	26.54 <sup>5</sup>
30.3	3.489 <sup>120</sup>	18.57 <sup>83</sup>	5.44 <sup>20</sup>	37.61 <sup>145</sup>	43.185 <sup>112</sup>	33.09 <sup>71</sup>	10.370 <sup>84</sup>	26.47 <sup>7</sup>
Feb. 9.3	3.322 <sup>167</sup>	19.15 <sup>58</sup>	5.17 <sup>27</sup>	38.69 <sup>108</sup>	43.029 <sup>156</sup>	33.60 <sup>51</sup>	10.249 <sup>121</sup>	26.36 <sup>11</sup>
	203	32	32	68	191	27	149	15
19.3	3.119	19.47	4.85	39.37	42.838	33.87	10.100	26.21
Mar. 1.3	2.892 <sup>227</sup>	19.51 <sup>4</sup>	4.49 <sup>36</sup>	39.61 <sup>24</sup>	42.622 <sup>216</sup>	33.89 <sup>2</sup>	9.929 <sup>171</sup>	26.01 <sup>20</sup>
11.2	2.654 <sup>238</sup>	19.26 <sup>25</sup>	4.13 <sup>36</sup>	39.41 <sup>20</sup>	42.397 <sup>225</sup>	33.63 <sup>26</sup>	9.749 <sup>180</sup>	25.74 <sup>27</sup>
21.2	2.421 <sup>233</sup>	18.73 <sup>53</sup>	3.77 <sup>36</sup>	38.77 <sup>64</sup>	42.175 <sup>222</sup>	33.13 <sup>50</sup>	9.571 <sup>178</sup>	25.44 <sup>30</sup>
31.2	2.206 <sup>215</sup>	17.94 <sup>79</sup>	3.43 <sup>34</sup>	37.72 <sup>105</sup>	41.970 <sup>205</sup>	32.40 <sup>73</sup>	9.408 <sup>163</sup>	25.11 <sup>33</sup>
	186	99	29	139	175	91	141	35
Apr. 10.2	2.020	16.95	3.14	36.33	41.795	31.49	9.267	24.76
20.1	1.877 <sup>143</sup>	15.77 <sup>118</sup>	2.91 <sup>23</sup>	34.64 <sup>169</sup>	41.659 <sup>136</sup>	30.42 <sup>107</sup>	9.159 <sup>108</sup>	24.42 <sup>34</sup>
30.1	1.786 <sup>91</sup>	14.49 <sup>128</sup>	2.75 <sup>16</sup>	32.73 <sup>191</sup>	41.571 <sup>88</sup>	29.25 <sup>117</sup>	9.090 <sup>69</sup>	24.13 <sup>29</sup>
May 10.1	1.749 <sup>37</sup>	13.14 <sup>135</sup>	2.67 <sup>8</sup>	30.65 <sup>208</sup>	41.536 <sup>35</sup>	28.04 <sup>121</sup>	9.065 <sup>25</sup>	23.90 <sup>23</sup>
20.0	1.772 <sup>23</sup>	11.79 <sup>135</sup>	2.68 <sup>1</sup>	28.51 <sup>214</sup>	41.559 <sup>23</sup>	26.82 <sup>122</sup>	9.087 <sup>22</sup>	23.75 <sup>15</sup>
	84	131	10	214	81	115	69	5
30.0	1.856	10.48	2.78	26.37	41.640	25.67	9.156	23.70
June 9.0	1.999 <sup>143</sup>	9.27 <sup>121</sup>	2.96 <sup>18</sup>	24.30 <sup>207</sup>	41.777 <sup>137</sup>	24.60 <sup>107</sup>	9.272 <sup>116</sup>	23.77 <sup>7</sup>
19.0	2.196 <sup>197</sup>	8.18 <sup>109</sup>	3.21 <sup>25</sup>	22.36 <sup>194</sup>	41.968 <sup>191</sup>	23.66 <sup>94</sup>	9.431 <sup>159</sup>	23.96 <sup>19</sup>
28.9	2.443 <sup>247</sup>	7.24 <sup>94</sup>	3.53 <sup>32</sup>	20.59 <sup>177</sup>	42.207 <sup>239</sup>	22.87 <sup>79</sup>	9.629 <sup>198</sup>	24.26 <sup>30</sup>
July 8.9	2.734 <sup>291</sup>	6.50 <sup>74</sup>	3.92 <sup>39</sup>	19.06 <sup>153</sup>	42.486 <sup>279</sup>	22.26 <sup>61</sup>	9.861 <sup>232</sup>	24.66 <sup>40</sup>
	327	56	45	127	316	44	262	43
18.9	3.061	5.94	4.37	17.79	42.802	21.82	10.123	25.14
28.9	3.418 <sup>357</sup>	5.58 <sup>36</sup>	4.86 <sup>49</sup>	16.79 <sup>100</sup>	43.146 <sup>344</sup>	21.57 <sup>25</sup>	10.406 <sup>283</sup>	25.68 <sup>54</sup>
Aug. 7.8	3.797 <sup>379</sup>	5.43 <sup>15</sup>	5.38 <sup>52</sup>	16.10 <sup>69</sup>	43.511 <sup>365</sup>	21.49 <sup>8</sup>	10.708 <sup>302</sup>	26.26 <sup>53</sup>
17.8	4.192 <sup>395</sup>	5.45 <sup>2</sup>	5.94 <sup>56</sup>	15.71 <sup>39</sup>	43.890 <sup>379</sup>	21.59 <sup>10</sup>	11.020 <sup>312</sup>	26.85 <sup>59</sup>
27.8	4.594 <sup>402</sup>	5.67 <sup>22</sup>	6.51 <sup>57</sup>	15.64 <sup>7</sup>	44.277 <sup>387</sup>	21.85 <sup>26</sup>	11.338 <sup>318</sup>	27.42 <sup>51</sup>
	405	37	57	24	389	39	320	52
Sept. 6.7	4.999	6.04	7.08	15.88	44.666	22.24	11.658	27.94
16.7	5.401 <sup>402</sup>	6.57 <sup>53</sup>	7.65 <sup>57</sup>	16.41 <sup>53</sup>	45.053 <sup>387</sup>	22.76 <sup>52</sup>	11.976 <sup>318</sup>	28.39 <sup>45</sup>
26.7	5.794 <sup>393</sup>	7.25 <sup>68</sup>	8.20 <sup>55</sup>	17.24 <sup>83</sup>	45.432 <sup>379</sup>	23.39 <sup>63</sup>	12.287 <sup>311</sup>	28.76 <sup>37</sup>
Oct. 6.7	6.175 <sup>381</sup>	8.05 <sup>80</sup>	8.73 <sup>53</sup>	18.35 <sup>111</sup>	45.798 <sup>366</sup>	24.14 <sup>75</sup>	12.587 <sup>300</sup>	29.04 <sup>23</sup>
16.6	6.539 <sup>364</sup>	8.97 <sup>92</sup>	9.25 <sup>52</sup>	19.70 <sup>135</sup>	46.147 <sup>349</sup>	24.97 <sup>83</sup>	12.874 <sup>287</sup>	29.22 <sup>18</sup>
	340	102	47	160	328	91	270	12
26.6	6.879	9.99	9.72	21.30	46.475	25.88	13.144	29.34
Nov. 5.6	7.191 <sup>312</sup>	11.11 <sup>112</sup>	10.15 <sup>43</sup>	23.10 <sup>180</sup>	46.775 <sup>300</sup>	26.87 <sup>99</sup>	13.392 <sup>248</sup>	29.39 <sup>5</sup>
15.6	7.470 <sup>279</sup>	12.32 <sup>121</sup>	10.54 <sup>39</sup>	25.08 <sup>198</sup>	47.042 <sup>267</sup>	27.93 <sup>106</sup>	13.615 <sup>223</sup>	29.38 <sup>1</sup>
25.5	7.708 <sup>238</sup>	13.59 <sup>127</sup>	10.86 <sup>32</sup>	27.21 <sup>213</sup>	47.272 <sup>230</sup>	29.04 <sup>111</sup>	13.808 <sup>193</sup>	29.34 <sup>4</sup>
Dec. 5.5	7.899 <sup>191</sup>	14.90 <sup>131</sup>	11.11 <sup>25</sup>	29.41 <sup>220</sup>	47.458 <sup>186</sup>	30.18 <sup>114</sup>	13.966 <sup>158</sup>	29.29 <sup>5</sup>
	138	132	17	224	136	116	118	6
15.5	8.037	16.22	11.28	31.65	47.594	31.34	14.084	29.23
25.4	8.120 <sup>83</sup>	17.52 <sup>130</sup>	11.36 <sup>8</sup>	33.85 <sup>220</sup>	47.677 <sup>83</sup>	32.47 <sup>113</sup>	14.159 <sup>75</sup>	29.17 <sup>6</sup>
35.4	8.145 <sup>25</sup>	18.75 <sup>123</sup>	11.36 <sup>0</sup>	35.93 <sup>208</sup>	47.704 <sup>27</sup>	33.54 <sup>107</sup>	14.188 <sup>29</sup>	29.12 <sup>5</sup>
Mean Place	0.620	6.11	1.676	21.09	40.402	21.44	8.007	20.43
Sec $\delta$ , Tan $\delta$	1.383	+0.956	2.020	+1.755	1.324	+0.868	1.075	+0.393
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.09	-0.02	+0.11	-0.03	+0.08	-0.02	+0.07	-0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Orionis. Mag. 4.6			17 Aurigæ. Mag. 3.3			ε Leporis. Mag. 3.3			β Eridani. Mag. 2.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	4	59	+15 17	5	0	+41 7	5	1	-22 28	5	3	- 5 11
	s		"	s		"	s		"	s		"
Jan. 0.4	51.898		27.48	44.512		33.07	59.012		54.42	48.376		31.92
10.4	51.903	5	27.10 38	44.511	1	34.11 104	58.981	31	56.59 217	48.370	6	33.38 146
20.4	51.864	39	26.75 35	44.454	57	35.02 91	58.906	75	58.52 193	48.323	47	34.67 129
30.4	51.783	81	26.43 32	44.345	109	35.76 74	58.791	115	60.14 162	48.236	87	35.77 110
Feb. 9.3	51.667	116	26.13 30	44.190	155	36.30 54	58.643	148	61.42 128	48.115	121	36.67 90
		144	27		190	30		176	92		147	67
19.3	51.523		25.86	44.000		36.60	58.467		62.34	47.968		37.34
Mar. 1.3	51.358	165	25.60 26	43.784	216	36.65 5	58.273	194	62.89 55	47.800	168	37.80 46
11.2	51.185	173	25.35 25	43.557	227	36.43 22	58.070	203	63.06 17	47.624	176	38.02 22
21.2	51.013	172	25.13 22	43.333	224	35.96 47	57.869	201	62.86 20	47.449	175	38.03 1
31.2	50.854	159	24.93 20	43.126	207	35.25 71	57.679	190	62.29 57	47.286	163	37.80 23
		138	15		179	90		168	91		145	44
Apr. 10.2	50.716		24.78	42.947		34.35	57.511		61.38	47.141		37.36
20.1	50.609	107	24.69 9	42.808	139	33.30 105	57.371	140	60.13 125	47.025	116	36.69 67
30.1	50.539	70	24.67 2	42.716	92	32.13 117	57.268	103	58.57 156	46.945	80	35.81 88
May 10.1	50.512	27	24.75 8	42.677	39	30.92 121	57.206	62	56.75 182	46.904	41	34.72 109
20.1	50.530	18	24.95 20	42.696	19	29.70 122	57.188	18	54.68 207	46.904	0	33.45 127
		64	31		76	116		28	226		45	143
30.0	50.594		25.26	42.772		28.54	57.216		52.42	46.949		32.02
June 9.0	50.702	108	25.69 43	42.905	133	27.45 109	57.289	73	50.02 240	47.037	88	30.45 157
19.0	50.852	150	26.23 54	43.091	186	26.48 97	57.406	117	47.54 248	47.165	128	28.77 168
28.9	51.040	188	26.86 63	43.326	235	25.66 82	57.563	157	45.04 250	47.331	166	27.05 172
July 8.9	51.262	222	27.58 72	43.602	276	25.01 65	57.756	193	42.60 244	47.530	199	25.33 172
		251	77		313	48		225	232		227	167
18.9	51.513		28.35	43.915		24.53	57.981		40.28	47.757		23.66
28.9	51.785	272	29.14 79	44.257	342	24.24 29	58.232	251	38.17 211	48.007	250	22.08 158
Aug. 7.8	52.073	288	29.92 78	44.620	363	24.11 18	58.504	272	36.31 186	48.274	267	20.67 141
17.8	52.374	301	30.65 73	44.998	378	24.15 4	58.789	285	34.79 152	48.554	280	19.47 120
27.8	52.681	307	31.31 66	45.384	386	24.35 20	59.085	296	33.67 112	48.841	287	18.52 95
		308	55		390	34		299	69		291	64
Sept. 6.8	52.989		31.86	45.774		24.69	59.384		32.98	49.132		17.88
16.7	53.294	305	32.29 43	46.162	388	25.16 47	59.683	299	32.76 22	49.421	289	17.57 31
26.7	53.594	300	32.57 28	46.543	381	25.75 50	59.975	292	33.02 26	49.704	283	17.58 1
Oct. 6.7	53.883	289	32.69 12	46.913	870	26.45 70	60.257	282	33.76 74	49.978	274	17.95 37
16.6	54.160	277	32.67 2	47.265	352	27.24 79	60.524	267	34.96 120	50.239	261	18.66 71
		260	16		333	88		246	162		245	99
26.6	54.420		32.51	47.598		28.12	60.770		36.58	50.484		19.65
Nov. 5.6	54.660	240	32.24 27	47.903	305	29.08 96	60.991	221	38.54 196	50.709	225	20.91 126
15.6	54.874	214	31.88 36	48.177	274	30.12 104	61.185	194	40.79 225	50.908	199	22.36 145
25.5	55.060	186	31.46 42	48.413	236	31.21 109	61.345	160	43.22 243	51.078	170	23.97 161
Dec. 5.5	55.212	152	31.02 44	48.605	192	32.35 114	61.468	123	45.76 254	51.216	138	25.64 167
		114	46		141	115		82	255		100	169
15.5	55.326		30.56	48.746		33.50	61.550		48.31	51.316		27.33
25.5	55.398	72	30.12 44	48.834	88	34.64 114	61.588	38	50.79 248	51.376	60	28.97 164
35.4	55.427	29	29.71 41	48.867	33	35.73 109	61.582	6	53.11 232	51.394	18	30.50 153
Mean Place	49.503		22.30	41.525		24.32	56.812		54.23	46.147		34.02
Sec δ, Tan δ	1.037		+0.273	1.328		+0.873	1.082		-0.414	1.004		-0.091
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.07		0.00	+0.08		-0.02	+0.05		+0.01	+0.06		0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.1		+1.0	+0.1		+1.0	+0.1		+1.0	+0.1		+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Aurigæ. Mag. 4 8		
	Right Ascension.		Declin- tion.
	h	m	
	5	7	+38
	s		"
Jan. 0.4	47.661	10	22.36
10.4	47.671	47	23.27
20.4	47.624	97	24.07
30.4	47.527	142	24.73
Feb. 9.3	47.385	179	25.23
19.3	47.206	203	25.51
Mar. 1.3	47.003	218	25.58
11.2	46.785	215	25.40
21.2	46.570	202	25.01
31.2	46.368	175	24.41
Apr. 10.2	46.193	140	23.62
20.1	46.053	93	22.70
30.1	45.960	43	21.68
May 10.1	45.917	12	20.62
20.1	45.929	67	19.55
30.0	45.996	121	18.52
June 9.0	46.117	173	17.56
19.0	46.290	220	16.72
28.9	46.510	261	16.02
July 8.9	46.771	296	15.46
18.9	47.067	324	15.06
28.9	47.391	347	14.81
Aug. 7.8	47.738	361	14.71
17.8	48.099	371	14.75
27.8	48.470	375	14.92
Sept. 6.8	48.845	375	15.22
16.7	49.220	369	15.61
26.7	49.589	359	16.09
Oct. 6.7	49.948	344	16.65
16.6	50.292	327	17.29
26.6	50.619	301	18.01
Nov. 5.6	50.920	271	18.78
15.6	51.191	237	19.62
25.5	51.428	195	20.52
Dec. 5.5	51.623	148	21.46
15.5	51.771	94	22.43
25.5	51.865	40	23.40
35.4	51.905		24.33
Mean Place	44.741		14.50
Sec $\delta$ , Tan $\delta$	1.276		+0.792
$D_{\mu} \alpha$ , $D_{\mu} \delta$	+0.08		-0.01
$D_{\mu} \delta$ , $D_{\mu} \delta$	+0.1		+1.0

**FOR THE UPPER TRANSIT AT WASHINGTON,**



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Orionis. (Bellatrix.) Mag. 1.7		$\beta$ Tauri. Mag. 1.8		17 Camelop. Mag. 5.8		$\beta$ Leporis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 20 s	° ' " + 6 16 "	h m 5 21 s	° ' " +28 32 "	h m 5 22 s	° ' " +62 59 "	h m 5 24 s	° ' " -20 49 "
Jan. 0.4	43.058	34.70	5.326	24.26	24.28	67.20	43.577	29.08
10.4	43.076	33.79 91	5.353	24.61 35	24.27 1	69.38 218	43.569 8	31.34 226
20.4	43.050	32.98 81	5.328	24.94 33	24.17 10	71.39 201	43.516 53	33.34 200
30.4	42.982	32.29 69	5.256	25.23 29	23.98 19	73.13 174	43.421 95	35.06 172
Feb. 9.3	42.876	31.70 59	5.141	25.43 20	23.71 27	74.55 142	43.287 134	36.48 142
	136	47	150	11	33	101	163	105
19.3	42.740	31.23 36	4.991	25.54	23.38	75.56 58	43.124	37.53 71
Mar. 1.3	42.581	30.87 23	4.815	25.53 1	23.00 38	76.14 12	42.938 186	38.24 34
11.3	42.411	30.64 13	4.625	25.40 13	22.58 42	76.26 34	42.740 198	38.58 1
21.2	42.238	30.51 2	4.433	25.14 36	22.18 40	75.92 78	42.538 193	38.57 38
31.2	42.075	30.49 11	4.250	24.78 46	21.80 38	75.14 118	42.345 175	38.19 73
Apr. 10.2	41.929	30.60 25	4.089	24.32 53	21.46 29	73.96 154	42.170 150	37.46 105
20.1	41.810	30.85 37	3.959	23.79 56	21.17 22	72.42 183	42.020 116	36.41 135
30.1	41.724	31.22 50	3.866	23.23 57	20.95 14	70.59 205	41.904 78	35.06 164
May 10.1	41.677	31.72 65	3.819	22.66 54	20.81 6	68.54 218	41.826 36	33.42 188
20.1	41.673	32.37 77	3.820	22.12 49	20.75 5	66.36 225	41.790 9	31.54 209
30.0	41.712	33.14 89	3.870	21.63 42	20.80 13	64.11 225	41.799 53	29.45 224
June 9.0	41.794	34.03 99	3.968	21.21 32	20.93 22	61.86 218	41.852 95	27.21 235
19.0	41.917	35.02 106	4.113	20.89 21	21.15 30	59.68 204	41.947 136	24.86 238
29.0	42.078	36.08 111	4.299	20.68 11	21.45 37	57.64 188	42.083 174	22.48 236
July 8.9	42.272	37.19 111	4.524	20.57 1	21.82 44	55.76 164	42.257 206	20.12 227
18.9	42.495	38.30 108	4.782	20.56 7	22.26 50	54.12 139	42.463 234	17.85 208
28.9	42.742	39.38 100	5.065	20.63 15	22.76 54	52.73 110	42.697 257	15.77 186
Aug. 7.8	43.009	40.38 89	5.371	20.78 21	23.30 57	51.63 81	42.954 275	13.91 154
17.8	43.289	41.27 71	5.691	20.99 25	23.87 60	50.82 50	43.229 286	12.37 118
27.8	43.578	41.98 53	6.021	21.24 27	24.47 62	50.32 18	43.515 295	11.19 77
Sept. 6.8	43.872	42.51 31	6.357	21.51 27	25.09 62	50.14 14	43.810 296	10.42 31
16.7	44.168	42.82 8	6.694	21.78 26	25.71 61	50.28 44	44.106 296	10.11 16
26.7	44.460	42.90 17	7.028	22.04 25	26.32 60	50.72 77	44.402 288	10.27 63
Oct. 6.7	44.746	42.73 39	7.356	22.29 22	26.92 59	51.49 106	44.690 277	10.90 109
16.7	45.023	42.34 60	7.673	22.51 22	27.51 55	52.55 134	44.967 259	11.99 151
26.6	45.285	41.74 79	7.974	22.73 22	28.06 50	53.89 160	45.226 240	13.50 187
Nov. 5.6	45.530	40.95 92	8.257	22.95 24	28.56 45	55.49 183	45.466 214	15.37 219
15.6	45.752	40.03 102	8.515	23.19 26	29.01 39	57.32 205	45.680 184	17.56 238
25.5	45.948	39.01 107	8.742	23.45 28	29.40 32	59.37 219	45.864 146	19.94 251
Dec. 5.5	46.111	37.94 107	8.934	23.73 31	29.72 24	61.56 228	46.010 107	22.45 256
15.5	46.237	36.87 104	9.084	24.04 33	29.96 14	63.84 231	46.117 64	25.01 250
25.5	46.323	35.83 98	9.188	24.37 34	30.10 4	66.15 225	46.181 18	27.51 236
35.4	46.366	34.85	9.242	24.71	30.14	68.40	46.199	29.87
Mean Place	40.711	31.57	2.635	18.52	19.643	58.21	41.340	29.19
Sec $\delta$ , Tan $\delta$	1.006	+0.110	1.138	+0.544	2.203	+1.963	1.070	-0.380
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	0.00	+0.08	-0.01	+0.11	-0.02	+0.05	0.00
D $\psi$ $\delta$ , D $\omega$ $\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\phi^1$ Orionis. Mag. 4.5			$\iota$ Orionis. Mag. 2.9			$\epsilon$ Orionis. Mag. 1.8			$\zeta$ Tauri. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	5	30	+ 9 26	5	31	- 5 57	5	32	- 1 15	5	32	+21 5
	s		"	s		"	s		"	s		"
Jan. 0.5	18.175		6.44	24.638		47.17	2.382		12.25	43.590		38.61
10.4	18.204	29	5.69 75	24.655	17	48.75 158	2.404	22	13.60 135	43.626	36	38.52 9
20.4	18.187	17	5.03 66	24.628	27	50.18 143	2.382	22	14.80 120	43.614	12	38.47 5
30.4	18.126	61	4.45 58	24.559	69	51.41 123	2.317	65	15.84 104	43.555	59	38.44 3
Feb. 9.3	18.028	98	3.98 47	24.452	107	52.43 102	2.214	103	16.70 86	43.454	101	38.40 4
		132	38		138	78		134	67		135	6
19.3	17.896		3.60	24.314		53.21	2.080		17.37	43.319		38.34
Mar. 1.3	17.741	155	3.28 32	24.151	163	53.77 56	1.922	158	17.86 49	43.156	163	38.26 8
11.3	17.571	170	3.07 21	23.976	175	54.09 32	1.750	172	18.15 29	42.979	177	38.13 13
21.2	17.397	174	2.93 14	23.797	179	54.18 9	1.574	176	18.25 10	42.797	182	37.97 16
31.2	17.232	165	2.88 5	23.624	173	54.02 16	1.406	168	18.17 8	42.622	175	37.76 21
		151	3		155	37		154	28		156	24
Apr. 10.2	17.081		2.91	23.469		53.65	1.252		17.89	42.466		37.52
20.2	16.958	123	3.04 13	23.338	131	53.04 61	1.124	128	17.43 46	42.337	129	37.28 24
30.1	16.865	93	3.28 24	23.237	101	52.22 82	1.027	97	16.78 65	42.241	96	37.06 22
May 10.1	16.813	52	3.63 35	23.174	63	51.20 102	0.968	59	15.96 82	42.187	54	36.86 20
20.1	16.801	12	4.09 46	23.152	22	49.98 122	0.950	18	14.97 99	42.177	10	36.72 14
		32	57		20	138		23	115		36	8
30.0	16.833		4.66	23.172		48.60	0.973		13.82	42.213		36.64
June 9.0	16.909	76	5.35 69	23.234	62	47.08 152	1.039	66	12.55 127	42.295	82	36.64 0
19.0	17.026	117	6.13 78	23.337	103	45.45 163	1.146	107	11.18 137	42.420	125	36.73 9
29.0	17.181	155	6.98 85	23.477	140	43.76 169	1.289	143	9.74 144	42.585	165	36.90 17
July 8.9	17.371	190	7.88 90	23.653	176	42.07 169	1.467	178	8.29 145	42.787	202	37.15 25
		220	92		206	165		209	144		233	31
18.9	17.591		8.80	23.859		40.42	1.676		6.85	43.020		37.46
28.9	17.834	243	9.70 90	24.090	231	38.86 156	1.909	233	5.48 137	43.280	260	37.81 35
Aug. 7.9	18.099	265	10.55 85	24.342	252	37.45 141	2.163	254	4.25 123	43.560	280	38.18 37
17.8	18.378	279	11.29 74	24.610	268	36.26 119	2.432	269	3.18 107	43.856	296	38.54 36
27.8	18.668	290	11.92 63	24.889	279	35.31 95	2.712	280	2.33 85	44.164	308	38.88 34
		296	45		286	63		287	58		315	28
Sept. 6.8	18.964		12.37	25.175		34.68	2.999		1.75	44.479		39.16
16.7	19.262	298	12.63 26	25.464	289	34.37 31	3.290	291	1.46 29	44.796	317	39.35 19
26.7	19.559	297	12.71 8	25.752	288	34.40 3	3.579	289	1.46 0	45.112	316	39.47 12
Oct. 6.7	19.851	292	12.57 14	26.035	283	34.79 39	3.863	284	1.78 32	45.424	312	39.51 4
16.7	20.134	283	12.22 35	26.310	275	35.53 74	4.140	277	2.41 63	45.726	302	39.46 5
		272	52		261	106		263	89		292	13
26.6	20.406		11.70	26.571		36.59	4.403		3.30	46.018		39.33
Nov. 5.6	20.660	254	11.01 69	26.816	245	37.91 132	4.650	247	4.45 115	46.293	275	39.13 20
15.6	20.893	233	10.21 80	27.038	222	39.45 154	4.876	226	5.77 132	46.545	252	38.91 22
25.6	21.100	207	9.33 88	27.234	196	41.16 171	5.074	198	7.23 146	46.769	224	38.68 23
Dec. 5.5	21.275	175	8.41 92	27.397	163	42.95 179	5.242	168	8.77 154	46.962	193	38.46 22
		139	91		126	182		131	155		153	20
15.5	21.414		7.50	27.523		44.77	5.373		10.32	47.115		38.26
25.5	21.512	98	6.62 88	27.609	86	46.55 178	5.463	90	11.84 152	47.225	110	38.09 17
35.4	21.566	54	5.81 81	27.651	42	48.22 167	5.511	48	13.27 143	47.289	64	37.98 11
Mean Place	15.778		3.34	22.359		48.67	0.075		14.21	41.020		34.40
Sec $\delta$ , Tan $\delta$	1.014		+0.166	1.005		-0.104	1.000		-0.022	1.072		+0.386
$D_{\phi} a$ , $D_{\alpha} a$	+0.07		0.00	+0.06		0.00	+0.06		0.00	+0.07		0.00
$D_{\phi} \delta$ , $D_{\alpha} \delta$	+0.1		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0





FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	22 H. Camelop. Mag. 4.7			7 Geminorum. Var. 3.2-4.2			2 Lynceis. Mag. 4.4			♄ Canis Majoris. Mag. 3.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	6	9	+69 20	6	9	+22 31	6	12	+59 2	6	17	-30 1
	s		"	s		"	s		"	s		"
Jan. 0.5	48.24		67.75	54.755		56.99	22.586		37.09	9.844		33.95
10.5	48.33	9	70.28 253	54.829	74	56.93 6	22.679	93	39.14 205	9.874	30	36.82 287
20.4	48.30	3	72.73 245	54.851	22	56.95 2	22.682	3	41.15 201	9.851	23	39.48 266
30.4	48.13	17	75.01 228	54.823	28	57.02 7	22.597	85	43.03 188	9.778	73	41.87 239
Feb. 9.4	47.85	28	77.00 199	54.747	76	57.11 9	22.432	165	44.69 166	9.658	120	43.91 204
		38	164		117	10		236	140		160	166
19.3	47.47		78.64	54.630		57.21	22.196		46.09	9.498		45.57
Mar. 1.3	47.02	45	79.86 122	54.482	148	57.28 7	21.904	292	47.13 104	9.308	190	46.83 126
11.3	46.51	51	80.61 75	54.310	172	57.31 3	21.574	330	47.78 65	9.094	214	47.69 86
21.3	45.97	54	80.87 26	54.128	182	57.30 1	21.222	352	48.02 24	8.870	224	48.11 42
31.2	45.44	53	80.62 25	53.945	183	57.23 7	20.872	350	47.84 18	8.645	225	48.11 0
		51	74		170	13		383	59		215	42
Apr. 10.2	44.93		79.88	53.775		57.10	20.539		47.25	8.430		47.69
20.2	44.47	46	78.69 119	53.625	150	56.94 16	20.241	298	46.29 96	8.233	197	46.87 82
30.2	44.09	38	77.09 160	53.506	119	56.74 20	19.992	240	44.98 131	8.064	169	45.67 120
May 10.1	43.80	29	75.16 193	53.424	82	56.53 21	19.805	187	43.39 159	7.927	137	44.12 155
20.1	43.60	20	72.95 221	53.382	42	56.33 20	19.688	117	41.58 181	7.830	97	42.27 185
		10	239		1	18		41	197		54	214
30.1	43.50		70.56	53.383		56.15	19.647		39.61	7.776		40.13
June 9.0	43.52	2	68.05 251	53.429	46	56.01 14	19.684	87	37.54 207	7.765	11	37.78 235
19.0	43.66	14	65.47 258	53.519	90	55.91 10	19.796	112	35.44 210	7.798	33	35.27 251
29.0	43.90	24	62.93 254	53.650	131	55.87 4	19.984	188	33.35 209	7.874	76	32.65 262
July 9.0	44.24	34	60.48 245	53.819	169	55.87 0	20.240	256	31.34 201	7.992	118	30.02 263
		43	231		203	4		319	189		156	256
18.9	44.67		58.17	54.022		55.91	20.559		29.45	8.148		27.46
28.9	45.19	52	56.06 211	54.253	231	55.97 6	20.936	377	27.72 173	8.339	191	25.04 242
Aug. 7.9	45.78	59	54.18 188	54.511	258	56.05 8	21.359	423	26.19 153	8.562	223	22.84 220
17.9	46.44	66	52.59 159	54.788	277	56.11 6	21.824	465	24.86 133	8.812	250	20.93 191
27.8	47.14	70	51.29 130	55.082	294	56.15 4	22.322	498	23.78 108	9.084	272	19.39 154
		74	99		307	1		522	84		290	110
Sept. 6.8	47.88		50.30	55.389		56.14	22.844		22.94	9.374		18.29
16.8	48.65	77	49.66 64	55.703	314	56.06 8	23.386	542	22.37 57	9.679	305	17.69 60
26.7	49.43	78	49.38 28	56.023	320	55.91 15	23.937	551	22.08 29	9.989	310	17.61 8
Oct. 6.7	50.22	79	49.47 9	56.345	322	55.68 23	24.491	554	22.07 1	10.303	314	18.08 47
16.7	50.99	77	49.91 44	56.664	319	55.39 29	25.039	548	22.35 28	10.614	311	19.08 100
		76	82		312	34		533	57		301	151
26.7	51.75		50.73	56.976		55.05	25.572		22.92	10.915		20.59
Nov. 5.6	52.46	71	51.91 118	57.276	300	54.67 38	26.083	511	23.78 86	11.202	287	22.57 198
15.6	53.12	66	53.44 153	57.560	284	54.29 38	26.558	475	24.92 114	11.465	263	24.94 237
25.6	53.70	58	55.27 183	57.820	260	53.92 37	26.988	430	26.31 139	11.701	236	27.64 270
Dec. 5.6	54.20	50	57.38 211	58.050	230	53.59 33	27.360	372	27.95 164	11.900	199	30.56 292
		40	232		193	25		306	182		157	304
15.5	54.60		59.70	58.243		53.34	27.666		29.77	12.057		33.60
25.5	54.89	29	62.16 246	58.392	149	53.15 19	27.894	228	31.73 196	12.167	110	36.64 304
35.5	55.04	15	64.71 255	58.494	102	53.05 10	28.036	142	33.77 204	12.227	60	39.62 298
Mean Place	42.225		63.47	52.098		54.92	18.204		33.52	7.529		34.03
Sec δ, Tan δ	2.836		+2.654	1.083		+0.415	1.944		+1.667	1.155		-0.578
Dψ a, Dω a	+0.13		+0.01	+0.07		0.00	+0.11		+0.01	+0.05		0.00
Dψ δ, Dω δ	0.0		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0



FOR THE UPPER TRANSIT AT





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ <sup>2</sup> Canis Majoris. Mag. 4.5		23 H. Camelop. Mag. 5.6		51 Aurigæ. Mag. 5.7		γ Geminorum. Mag. 1.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 31 s	° ' " -22 53 "	h m 6 32 s	° ' " +79 39 "	h m 6 32 s	° ' " +39 27 "	h m 6 32 s	° ' " +16 28 "
Jan. 0.5	36.979	51.59	16.68	27.96	57.687	55.71	57.628	16.58
10.5	37.035 <sup>56</sup>	54.23 <sup>264</sup>	16.87 <sup>19</sup>	30.87 <sup>291</sup>	57.797 <sup>110</sup>	56.65 <sup>94</sup>	57.721 <sup>93</sup>	16.10 <sup>48</sup>
20.4	37.039 <sup>4</sup>	56.70 <sup>247</sup>	16.81 <sup>6</sup>	33.73 <sup>286</sup>	57.845 <sup>48</sup>	57.65 <sup>100</sup>	57.764 <sup>43</sup>	15.72 <sup>38</sup>
30.4	36.994 <sup>45</sup>	58.91 <sup>221</sup>	16.52 <sup>29</sup>	36.44 <sup>271</sup>	57.831 <sup>14</sup>	58.64 <sup>99</sup>	57.756 <sup>8</sup>	15.46 <sup>26</sup>
Feb. 9.4	36.903 <sup>91</sup>	60.83 <sup>192</sup>	15.98 <sup>54</sup>	38.88 <sup>244</sup>	57.759 <sup>72</sup>	59.59 <sup>95</sup>	57.700 <sup>56</sup>	15.28 <sup>18</sup>
19.4	36.772 <sup>131</sup>	62.41 <sup>158</sup>	15.25 <sup>73</sup>	40.96 <sup>208</sup>	57.634 <sup>125</sup>	60.43 <sup>84</sup>	57.603 <sup>97</sup>	15.18 <sup>10</sup>
Mar. 1.3	36.607 <sup>165</sup>	63.63 <sup>122</sup>	14.36 <sup>89</sup>	42.59 <sup>163</sup>	57.466 <sup>168</sup>	61.12 <sup>69</sup>	57.470 <sup>133</sup>	15.13 <sup>5</sup>
11.3	36.420 <sup>187</sup>	64.48 <sup>85</sup>	13.34 <sup>102</sup>	43.72 <sup>113</sup>	57.268 <sup>198</sup>	61.62 <sup>50</sup>	57.312 <sup>158</sup>	15.11 <sup>2</sup>
21.3	36.219 <sup>201</sup>	64.97 <sup>49</sup>	12.25 <sup>109</sup>	44.30 <sup>58</sup>	57.049 <sup>219</sup>	61.89 <sup>27</sup>	57.140 <sup>172</sup>	15.11 <sup>0</sup>
31.2	36.015 <sup>204</sup>	65.06 <sup>9</sup>	11.14 <sup>111</sup>	44.29 <sup>1</sup>	56.827 <sup>222</sup>	61.94 <sup>5</sup>	56.964 <sup>176</sup>	15.12 <sup>1</sup>
Apr. 10.2	35.818 <sup>197</sup>	64.80 <sup>26</sup>	10.06 <sup>108</sup>	43.73 <sup>56</sup>	56.614 <sup>213</sup>	61.75 <sup>19</sup>	56.795 <sup>169</sup>	15.14 <sup>2</sup>
20.2	35.637 <sup>181</sup>	64.18 <sup>62</sup>	9.06 <sup>100</sup>	42.63 <sup>110</sup>	56.420 <sup>194</sup>	61.35 <sup>40</sup>	56.643 <sup>152</sup>	15.16 <sup>2</sup>
30.2	35.480 <sup>157</sup>	63.22 <sup>96</sup>	8.17 <sup>89</sup>	41.05 <sup>158</sup>	56.258 <sup>162</sup>	60.75 <sup>60</sup>	56.517 <sup>126</sup>	15.20 <sup>4</sup>
May 10.1	35.354 <sup>126</sup>	61.94 <sup>128</sup>	7.42 <sup>75</sup>	39.03 <sup>202</sup>	56.136 <sup>122</sup>	59.96 <sup>79</sup>	56.421 <sup>96</sup>	15.25 <sup>5</sup>
20.1	35.263 <sup>91</sup>	60.37 <sup>157</sup>	6.86 <sup>56</sup>	36.67 <sup>236</sup>	56.059 <sup>77</sup>	59.05 <sup>91</sup>	56.364 <sup>57</sup>	15.34 <sup>9</sup>
30.1	35.211 <sup>52</sup>	58.56 <sup>181</sup>	6.49 <sup>37</sup>	34.01 <sup>266</sup>	56.031 <sup>28</sup>	58.04 <sup>101</sup>	56.346 <sup>18</sup>	15.47 <sup>13</sup>
June 9.1	35.200 <sup>11</sup>	56.52 <sup>204</sup>	6.32 <sup>17</sup>	31.17 <sup>284</sup>	56.053 <sup>22</sup>	56.97 <sup>107</sup>	56.369 <sup>23</sup>	15.63 <sup>16</sup>
19.0	35.230 <sup>30</sup>	54.34 <sup>218</sup>	6.38 <sup>6</sup>	28.21 <sup>296</sup>	56.127 <sup>74</sup>	55.86 <sup>111</sup>	56.433 <sup>64</sup>	15.84 <sup>21</sup>
29.0	35.300 <sup>70</sup>	52.05 <sup>229</sup>	6.63 <sup>25</sup>	25.22 <sup>299</sup>	56.250 <sup>123</sup>	54.76 <sup>110</sup>	56.537 <sup>104</sup>	16.10 <sup>26</sup>
July 9.0	35.409 <sup>109</sup>	49.73 <sup>232</sup>	7.10 <sup>47</sup>	22.26 <sup>296</sup>	56.419 <sup>169</sup>	53.69 <sup>107</sup>	56.676 <sup>139</sup>	16.37 <sup>27</sup>
18.9	35.553 <sup>144</sup>	47.44 <sup>229</sup>	7.76 <sup>66</sup>	19.41 <sup>285</sup>	56.630 <sup>211</sup>	52.66 <sup>103</sup>	56.850 <sup>174</sup>	16.65 <sup>28</sup>
28.9	35.731 <sup>178</sup>	45.27 <sup>217</sup>	8.60 <sup>84</sup>	16.75 <sup>266</sup>	56.878 <sup>248</sup>	51.69 <sup>97</sup>	57.053 <sup>203</sup>	16.92 <sup>27</sup>
Aug. 7.9	35.939 <sup>208</sup>	43.27 <sup>200</sup>	9.59 <sup>99</sup>	14.31 <sup>244</sup>	57.158 <sup>280</sup>	50.80 <sup>89</sup>	57.282 <sup>229</sup>	16.92 <sup>23</sup>
17.9	36.172 <sup>233</sup>	41.54 <sup>173</sup>	10.72 <sup>113</sup>	12.16 <sup>215</sup>	57.467 <sup>309</sup>	49.99 <sup>81</sup>	57.534 <sup>252</sup>	17.15 <sup>19</sup>
27.8	36.428 <sup>256</sup>	40.12 <sup>142</sup>	11.97 <sup>125</sup>	10.32 <sup>184</sup>	57.799 <sup>332</sup>	49.27 <sup>72</sup>	57.804 <sup>270</sup>	17.34 <sup>10</sup>
Sept. 6.8	36.702 <sup>274</sup>	39.09 <sup>103</sup>	13.33 <sup>136</sup>	8.85 <sup>147</sup>	58.150 <sup>351</sup>	48.62 <sup>65</sup>	58.088 <sup>284</sup>	17.44 <sup>1</sup>
16.8	36.989 <sup>287</sup>	38.51 <sup>58</sup>	14.75 <sup>142</sup>	7.76 <sup>109</sup>	58.515 <sup>365</sup>	48.05 <sup>57</sup>	58.384 <sup>296</sup>	17.43 <sup>12</sup>
26.8	37.286 <sup>297</sup>	38.40 <sup>11</sup>	16.22 <sup>147</sup>	7.08 <sup>68</sup>	58.891 <sup>376</sup>	47.58 <sup>47</sup>	58.690 <sup>306</sup>	17.31 <sup>28</sup>
Oct. 6.7	37.589 <sup>303</sup>	38.79 <sup>39</sup>	17.71 <sup>149</sup>	6.83 <sup>25</sup>	59.273 <sup>382</sup>	47.21 <sup>37</sup>	59.000 <sup>310</sup>	17.03 <sup>40</sup>
16.7	37.892 <sup>303</sup>	39.67 <sup>88</sup>	19.20 <sup>149</sup>	7.02 <sup>19</sup>	59.656 <sup>383</sup>	46.96 <sup>25</sup>	59.312 <sup>312</sup>	16.63 <sup>52</sup>
26.7	38.189 <sup>297</sup>	41.03 <sup>136</sup>	20.65 <sup>145</sup>	7.66 <sup>64</sup>	60.035 <sup>379</sup>	46.82 <sup>14</sup>	59.621 <sup>309</sup>	16.11 <sup>65</sup>
Nov. 5.6	38.476 <sup>287</sup>	42.81 <sup>178</sup>	22.02 <sup>137</sup>	8.73 <sup>107</sup>	60.404 <sup>369</sup>	46.81 <sup>1</sup>	59.921 <sup>300</sup>	15.46 <sup>74</sup>
15.6	38.744 <sup>268</sup>	44.97 <sup>216</sup>	23.31 <sup>129</sup>	10.24 <sup>151</sup>	60.755 <sup>351</sup>	46.81 <sup>14</sup>	60.209 <sup>288</sup>	14.72 <sup>78</sup>
25.6	38.989 <sup>245</sup>	47.41 <sup>244</sup>	24.47 <sup>116</sup>	12.13 <sup>189</sup>	61.082 <sup>327</sup>	46.95 <sup>31</sup>	60.476 <sup>267</sup>	13.94 <sup>81</sup>
Dec. 5.6	39.202 <sup>213</sup>	50.08 <sup>267</sup>	25.46 <sup>99</sup>	14.38 <sup>225</sup>	61.375 <sup>293</sup>	47.26 <sup>46</sup>	60.717 <sup>241</sup>	13.13 <sup>79</sup>
15.5	39.377 <sup>175</sup>	52.85 <sup>277</sup>	26.25 <sup>79</sup>	16.93 <sup>255</sup>	61.626 <sup>251</sup>	47.72 <sup>63</sup>	60.923 <sup>206</sup>	12.34 <sup>72</sup>
25.5	39.508 <sup>131</sup>	55.65 <sup>280</sup>	26.83 <sup>58</sup>	19.68 <sup>275</sup>	61.826 <sup>200</sup>	48.35 <sup>78</sup>	61.089 <sup>166</sup>	11.62 <sup>66</sup>
35.5	39.593 <sup>85</sup>	58.38 <sup>273</sup>	27.16 <sup>33</sup>	22.56 <sup>288</sup>	61.970 <sup>144</sup>	49.13 <sup>88</sup>	61.209 <sup>120</sup>	10.96 <sup>66</sup>
								10.41 <sup>55</sup>
Mean Place	34.686	51.86	5.571	25.93	54.535	54.79	55.063	16.07
Sec δ, Tan δ	1.086	-0.422	5.570	+5.479	1.295	+0.823	1.043	+0.296
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.05	0.00	+0.20	+0.05	+0.08	+0.01	+0.07	0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Argus. Mag. 3.2		♂ Monocerotis. Mag. 4.7		♊ Geminorum. Mag. 3.2		♊ Geminorum. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 35 s	° ' -43 7 "	h m 6 36 s	° ' + 9 58 "	h m 6 38 s	° ' +25 12 "	h m 6 40 s	° ' +12 59 "
Jan. 0.5	15.825	21.06	26.918	24.77	52.322	52.19	40.411	10.10
10.5	15.851 <sup>26</sup>	24.44 <sup>338</sup>	27.009 <sup>91</sup>	23.88 <sup>89</sup>	52.428 <sup>106</sup>	52.24 <sup>5</sup>	40.508 <sup>97</sup>	9.38 <sup>72</sup>
20.4	15.815 <sup>36</sup>	27.61 <sup>317</sup>	27.051 <sup>42</sup>	23.12 <sup>76</sup>	52.481 <sup>53</sup>	52.39 <sup>15</sup>	40.556 <sup>48</sup>	8.78 <sup>60</sup>
30.4	15.719 <sup>96</sup>	30.50 <sup>289</sup>	27.044 <sup>7</sup>	22.49 <sup>63</sup>	52.478 <sup>3</sup>	52.62 <sup>23</sup>	40.554 <sup>2</sup>	8.31 <sup>47</sup>
Feb. 9.4	15.570 <sup>149</sup>	33.03 <sup>253</sup>	26.991 <sup>53</sup>	21.99 <sup>50</sup>	52.425 <sup>53</sup>	52.89 <sup>27</sup>	40.504 <sup>50</sup>	7.95 <sup>36</sup>
19.4	15.373 <sup>197</sup>	35.16 <sup>213</sup>	26.897 <sup>94</sup>	21.62 <sup>37</sup>	52.326 <sup>99</sup>	53.17 <sup>28</sup>	40.412 <sup>92</sup>	7.71 <sup>24</sup>
Mar. 1.3	15.138 <sup>235</sup>	36.84 <sup>168</sup>	26.768 <sup>129</sup>	21.36 <sup>26</sup>	52.190 <sup>136</sup>	53.42 <sup>25</sup>	40.285 <sup>127</sup>	7.54 <sup>17</sup>
11.3	14.875 <sup>263</sup>	38.04 <sup>120</sup>	26.614 <sup>154</sup>	21.20 <sup>16</sup>	52.026 <sup>164</sup>	53.63 <sup>21</sup>	40.132 <sup>153</sup>	7.45 <sup>9</sup>
21.3	14.597 <sup>278</sup>	38.76 <sup>72</sup>	26.445 <sup>169</sup>	21.12 <sup>8</sup>	51.845 <sup>181</sup>	53.78 <sup>15</sup>	39.962 <sup>170</sup>	7.41 <sup>4</sup>
31.3	14.314 <sup>283</sup>	38.98 <sup>22</sup>	26.273 <sup>172</sup>	21.12 <sup>0</sup>	51.659 <sup>186</sup>	53.84 <sup>6</sup>	39.789 <sup>173</sup>	7.43 <sup>2</sup>
Apr. 10.2	14.037 <sup>277</sup>	38.72 <sup>26</sup>	26.107 <sup>166</sup>	21.18 <sup>6</sup>	51.479 <sup>180</sup>	53.81 <sup>3</sup>	39.621 <sup>168</sup>	7.48 <sup>5</sup>
20.2	13.778 <sup>259</sup>	37.99 <sup>73</sup>	25.956 <sup>151</sup>	21.32 <sup>14</sup>	51.316 <sup>163</sup>	53.70 <sup>11</sup>	39.468 <sup>153</sup>	7.57 <sup>9</sup>
30.2	13.545 <sup>233</sup>	36.80 <sup>119</sup>	25.830 <sup>126</sup>	21.55 <sup>23</sup>	51.178 <sup>138</sup>	53.52 <sup>18</sup>	39.340 <sup>128</sup>	7.70 <sup>13</sup>
May 10.1	13.347 <sup>198</sup>	35.19 <sup>161</sup>	25.734 <sup>96</sup>	21.83 <sup>28</sup>	51.075 <sup>103</sup>	53.27 <sup>25</sup>	39.241 <sup>99</sup>	7.88 <sup>18</sup>
20.1	13.189 <sup>158</sup>	33.20 <sup>199</sup>	25.674 <sup>60</sup>	22.19 <sup>36</sup>	51.010 <sup>65</sup>	52.99 <sup>28</sup>	39.178 <sup>63</sup>	8.12 <sup>24</sup>
30.1	13.078 <sup>111</sup>	30.90 <sup>230</sup>	25.652 <sup>22</sup>	22.63 <sup>44</sup>	50.986 <sup>24</sup>	52.69 <sup>30</sup>	39.153 <sup>25</sup>	8.41 <sup>29</sup>
June 9.1	13.014 <sup>64</sup>	28.31 <sup>259</sup>	25.669 <sup>17</sup>	23.14 <sup>51</sup>	51.006 <sup>20</sup>	52.38 <sup>31</sup>	39.168 <sup>15</sup>	8.74 <sup>33</sup>
19.0	13.000 <sup>14</sup>	25.52 <sup>279</sup>	25.726 <sup>57</sup>	23.70 <sup>56</sup>	51.068 <sup>62</sup>	52.08 <sup>30</sup>	39.223 <sup>55</sup>	9.13 <sup>39</sup>
29.0	13.037 <sup>37</sup>	22.59 <sup>293</sup>	25.821 <sup>95</sup>	24.31 <sup>61</sup>	51.173 <sup>105</sup>	51.80 <sup>28</sup>	39.315 <sup>92</sup>	9.55 <sup>42</sup>
July 9.0	13.123 <sup>86</sup>	19.62 <sup>297</sup>	25.952 <sup>131</sup>	24.95 <sup>64</sup>	51.315 <sup>142</sup>	51.53 <sup>27</sup>	39.445 <sup>130</sup>	10.00 <sup>45</sup>
19.0	13.256 <sup>133</sup>	16.68 <sup>294</sup>	26.115 <sup>163</sup>	25.59 <sup>64</sup>	51.494 <sup>179</sup>	51.30 <sup>23</sup>	39.608 <sup>163</sup>	10.45 <sup>45</sup>
28.9	13.434 <sup>178</sup>	13.86 <sup>282</sup>	26.307 <sup>192</sup>	26.20 <sup>61</sup>	51.705 <sup>211</sup>	51.07 <sup>23</sup>	39.799 <sup>191</sup>	10.87 <sup>42</sup>
Aug. 7.9	13.654 <sup>220</sup>	11.28 <sup>258</sup>	26.526 <sup>219</sup>	26.75 <sup>55</sup>	51.943 <sup>238</sup>	50.84 <sup>23</sup>	40.017 <sup>218</sup>	11.25 <sup>38</sup>
17.9	13.910 <sup>256</sup>	9.00 <sup>228</sup>	26.766 <sup>240</sup>	27.21 <sup>46</sup>	52.206 <sup>263</sup>	50.59 <sup>25</sup>	40.258 <sup>241</sup>	11.55 <sup>30</sup>
27.8	14.197 <sup>287</sup>	7.12 <sup>188</sup>	27.025 <sup>259</sup>	27.54 <sup>33</sup>	52.488 <sup>282</sup>	50.33 <sup>26</sup>	40.518 <sup>260</sup>	11.73 <sup>18</sup>
Sept. 6.8	14.512 <sup>315</sup>	5.71 <sup>141</sup>	27.299 <sup>274</sup>	27.69 <sup>15</sup>	52.788 <sup>300</sup>	50.03 <sup>30</sup>	40.793 <sup>275</sup>	11.78 <sup>5</sup>
16.8	14.847 <sup>335</sup>	4.84 <sup>87</sup>	27.585 <sup>286</sup>	27.68 <sup>1</sup>	53.101 <sup>313</sup>	49.68 <sup>35</sup>	41.081 <sup>288</sup>	11.68 <sup>10</sup>
26.8	15.197 <sup>350</sup>	4.55 <sup>29</sup>	27.880 <sup>295</sup>	27.46 <sup>22</sup>	53.423 <sup>322</sup>	49.29 <sup>39</sup>	41.379 <sup>298</sup>	11.41 <sup>27</sup>
Oct. 6.7	15.554 <sup>357</sup>	4.86 <sup>31</sup>	28.181 <sup>301</sup>	27.04 <sup>42</sup>	53.751 <sup>328</sup>	48.86 <sup>43</sup>	41.684 <sup>305</sup>	10.98 <sup>43</sup>
16.7	15.910 <sup>356</sup>	5.80 <sup>94</sup>	28.484 <sup>303</sup>	26.42 <sup>62</sup>	54.083 <sup>332</sup>	48.38 <sup>48</sup>	41.991 <sup>307</sup>	10.36 <sup>62</sup>
26.7	16.256 <sup>346</sup>	7.32 <sup>152</sup>	28.784 <sup>300</sup>	25.63 <sup>79</sup>	54.412 <sup>329</sup>	47.88 <sup>50</sup>	42.295 <sup>304</sup>	9.59 <sup>77</sup>
Nov. 5.7	16.587 <sup>331</sup>	9.39 <sup>207</sup>	29.077 <sup>293</sup>	24.68 <sup>95</sup>	54.734 <sup>322</sup>	47.38 <sup>50</sup>	42.593 <sup>298</sup>	8.71 <sup>88</sup>
15.6	16.891 <sup>304</sup>	11.94 <sup>255</sup>	29.358 <sup>281</sup>	23.62 <sup>106</sup>	55.042 <sup>308</sup>	46.90 <sup>48</sup>	42.881 <sup>288</sup>	7.74 <sup>97</sup>
25.6	17.161 <sup>270</sup>	14.89 <sup>295</sup>	29.618 <sup>260</sup>	22.50 <sup>112</sup>	55.330 <sup>288</sup>	46.48 <sup>42</sup>	43.148 <sup>267</sup>	6.72 <sup>102</sup>
Dec. 5.6	17.389 <sup>228</sup>	18.12 <sup>323</sup>	29.854 <sup>236</sup>	21.35 <sup>115</sup>	55.590 <sup>260</sup>	46.13 <sup>35</sup>	43.390 <sup>242</sup>	5.71 <sup>101</sup>
15.5	17.567 <sup>178</sup>	21.54 <sup>342</sup>	30.056 <sup>202</sup>	20.22 <sup>113</sup>	55.815 <sup>225</sup>	45.90 <sup>23</sup>	43.599 <sup>209</sup>	4.73 <sup>98</sup>
25.5	17.689 <sup>122</sup>	25.04 <sup>350</sup>	30.218 <sup>162</sup>	19.15 <sup>107</sup>	55.998 <sup>183</sup>	45.77 <sup>13</sup>	43.768 <sup>169</sup>	3.83 <sup>90</sup>
35.5	17.751 <sup>62</sup>	28.49 <sup>345</sup>	30.336 <sup>118</sup>	18.19 <sup>96</sup>	56.132 <sup>134</sup>	45.75 <sup>2</sup>	43.892 <sup>124</sup>	3.03 <sup>80</sup>
Mean Place	13.382	21.57	24.445	24.51	49.590	51.95	37.896	10.03
Sec δ, Tan δ	1.370	-0.937	1.015	+0.176	1.105	+0.471	1.026	+0.231
D <sub>♄</sub> α, D <sub>♄</sub> δ	+0.04	-0.01	+0.07	0.00	+0.07	+0.01	+0.07	0.00
D <sub>♊</sub> δ, D <sub>♊</sub> δ	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0



**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Canis Majoris. Mag. 4.2		$\epsilon$ Canis Majoris. Mag. 1.6		$\zeta$ Geminorum. Var. 3.7-4.3		$\alpha^2$ Canis Majoris. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 50 s	° ' " -11 55 "	h m 6 55 s	° ' " -28 51 "	h m 6 59 s	° ' " +20 41 "	h m 6 59 s	° ' " -23 42 "
Jan. 0.5	22.348 86	61.18 220	24.117 75	29.51 299	13.884 123	33.99 28	35.801 85	39.88 279
10.5	22.434 37	63.38 202	24.192 20	32.50 283	14.007 71	33.71 16	35.886 33	42.67 262
20.5	22.471 12	65.40 182	24.212 33	35.33 257	14.078 18	33.55 4	35.919 20	45.29 240
30.4	22.459 58	67.22 157	24.179 83	37.90 229	14.096 34	33.51 5	35.899 68	47.69 211
Feb. 9.4	22.401 100	68.79 131	24.096 127	40.19 193	14.062 80	33.56 12	35.831 112	49.80 179
19.4	22.301 134	70.10 102	23.969 164	42.12 156	13.982 120	33.68 15	35.719 146	51.59 145
Mar. 1.3	22.167 160	71.12 73	23.805 192	43.68 116	13.862 149	33.83 17	35.573 177	53.04 108
11.3	22.007 176	71.85 45	23.613 210	44.84 76	13.713 170	34.00 15	35.396 193	54.12 69
21.3	21.831 183	72.30 15	23.403 217	45.60 33	13.543 178	34.15 12	35.203 203	54.81 33
31.3	21.648 178	72.45 12	23.186 214	45.93 7	13.365 175	34.27 9	35.000 200	55.14 5
Apr. 10.2	21.470 165	72.33 39	22.972 202	45.86 46	13.190 162	34.36 3	34.800 189	55.09 42
20.2	21.305 145	71.94 66	22.770 182	45.40 85	13.028 141	34.39 0	34.611 168	54.67 77
30.2	21.160 117	71.28 90	22.588 153	44.55 122	12.887 111	34.39 3	34.443 143	53.90 111
May 10.2	21.043 85	70.38 114	22.435 119	43.33 155	12.776 77	34.36 6	34.300 110	52.79 138
20.1	20.958 50	69.24 133	22.316 83	41.78 184	12.699 38	34.30 7	34.190 74	51.41 168
30.1	20.908 11	67.91 150	22.233 43	39.94 210	12.661 0	34.23 7	34.116 36	49.73 190
June 9.1	20.897 27	66.41 165	22.190 2	37.84 228	12.661 41	34.16 7	34.080 3	47.83 209
19.0	20.924 64	64.76 173	22.188 40	35.56 242	12.702 81	34.09 6	34.083 43	45.74 220
29.0	20.988 99	63.03 178	22.228 80	33.14 249	12.783 119	34.03 6	34.126 81	43.54 228
July 9.0	21.087 134	61.25 176	22.308 119	30.65 248	12.902 153	33.97 6	34.207 118	41.26 227
19.0	21.221 165	59.49 168	22.427 154	28.17 239	13.055 184	33.91 8	34.325 153	38.99 219
28.9	21.386 192	57.81 155	22.581 187	25.78 222	13.239 213	33.83 10	34.478 184	36.80 202
Aug. 7.9	21.578 217	56.26 136	22.768 219	23.56 197	13.452 238	33.73 15	34.662 212	34.78 182
17.9	21.795 239	54.90 109	22.987 245	21.59 165	13.690 260	33.58 22	34.874 236	32.96 149
27.9	22.034 257	53.81 79	23.232 260	19.94 124	13.950 278	33.36 29	35.110 260	31.47 113
Sept. 6.8	22.291 272	53.02 42	23.501 286	18.70 79	14.228 293	33.07 39	35.370 278	30.34 71
16.8	22.563 284	52.60 5	23.787 303	17.91 29	14.521 307	32.68 48	35.648 291	29.63 23
26.8	22.847 292	52.55 39	24.090 312	17.62 24	14.828 316	32.20 57	35.939 304	29.40 25
Oct. 6.7	23.139 296	52.94 76	24.402 316	17.86 78	15.144 322	31.63 67	36.243 307	29.65 76
16.7	23.435 295	53.70 117	24.718 315	18.64 130	15.466 323	30.96 74	36.550 307	30.41 125
26.7	23.730 288	54.87 153	25.033 306	19.94 179	15.789 319	30.22 77	36.857 301	31.66 171
Nov. 5.7	24.018 276	56.40 182	25.339 291	21.73 222	16.108 309	29.45 79	37.158 287	33.37 210
15.6	24.294 257	58.22 207	25.630 267	23.95 257	16.417 293	28.66 77	37.445 266	35.47 242
25.6	24.551 231	60.29 224	25.897 238	26.52 283	16.710 268	27.89 70	37.711 239	37.89 268
Dec. 5.6	24.782 197	62.53 232	26.135 199	29.35 302	16.978 236	27.19 61	37.950 203	40.57 282
15.6	24.979 157	64.85 233	26.334 153	32.37 308	17.214 198	26.58 50	38.153 160	43.39 289
25.5	25.136 113	67.18 226	26.487 104	35.45 305	17.412 150	26.08 37	38.313 114	46.28 285
35.5	25.249	69.44	26.591	38.50	17.562	25.71	38.427	49.13
Mean Place	20.048	61.24	21.817	30.10	11.248	35.05	33.520	40.29
Sec $\delta$ , Tan $\delta$	1.022	-0.211	1.142	-0.551	1.069	+0.378	1.092	-0.439
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	0.00	+0.05	-0.01	+0.07	+0.01	+0.05	-0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Canis Majoris. Mag. 4.1		δ Canis Majoris. Mag. 2.0		63 Aurigæ. Mag. 5.1		51 Geminorum. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 0	° ' " -15 30	h m 7 5	° ' " -26 15	h m 7 5	° ' " +39 27	h m 7 8	° ' " +16 17
	s	"	s	"	s	"	s	"
Jan. 0.5	2.506 <sup>92</sup>	35.19 <sup>241</sup>	3.215 <sup>88</sup>	37.80 <sup>292</sup>	60.139 <sup>151</sup>	23.73 <sup>87</sup>	38.969 <sup>128</sup>	61.50 <sup>60</sup>
10.5	2.598 <sup>43</sup>	37.60 <sup>225</sup>	3.303 <sup>35</sup>	40.72 <sup>276</sup>	60.290 <sup>88</sup>	24.60 <sup>98</sup>	39.097 <sup>78</sup>	60.90 <sup>45</sup>
20.5	2.641 <sup>7</sup>	39.85 <sup>202</sup>	3.338 <sup>18</sup>	43.48 <sup>253</sup>	60.378 <sup>25</sup>	25.58 <sup>104</sup>	39.175 <sup>26</sup>	60.45 <sup>32</sup>
30.4	2.634 <sup>54</sup>	41.87 <sup>178</sup>	3.320 <sup>68</sup>	46.01 <sup>224</sup>	60.403 <sup>38</sup>	26.62 <sup>105</sup>	39.201 <sup>25</sup>	60.13 <sup>18</sup>
Feb. 9.4	2.580 <sup>97</sup>	43.65 <sup>149</sup>	3.252 <sup>113</sup>	48.25 <sup>192</sup>	60.365 <sup>94</sup>	27.67 <sup>101</sup>	39.176 <sup>71</sup>	59.95 <sup>8</sup>
19.4	2.483 <sup>133</sup>	45.14 <sup>118</sup>	3.139 <sup>151</sup>	50.17 <sup>156</sup>	60.271 <sup>143</sup>	28.68 <sup>89</sup>	39.105 <sup>111</sup>	59.87 <sup>0</sup>
Mar. 1.4	2.350 <sup>161</sup>	46.32 <sup>88</sup>	2.988 <sup>179</sup>	51.73 <sup>118</sup>	60.128 <sup>181</sup>	29.57 <sup>73</sup>	38.994 <sup>140</sup>	59.87 <sup>5</sup>
11.3	2.189 <sup>178</sup>	47.20 <sup>56</sup>	2.809 <sup>198</sup>	52.91 <sup>79</sup>	59.947 <sup>207</sup>	30.30 <sup>54</sup>	38.854 <sup>162</sup>	59.92 <sup>9</sup>
21.3	2.011 <sup>185</sup>	47.76 <sup>24</sup>	2.611 <sup>207</sup>	53.70 <sup>39</sup>	59.740 <sup>218</sup>	30.84 <sup>31</sup>	38.692 <sup>172</sup>	60.01 <sup>11</sup>
31.3	1.826 <sup>184</sup>	48.00 <sup>6</sup>	2.404 <sup>207</sup>	54.09 <sup>1</sup>	59.522 <sup>217</sup>	31.15 <sup>9</sup>	38.520 <sup>171</sup>	60.12 <sup>11</sup>
Apr. 10.2	1.642 <sup>171</sup>	47.94 <sup>38</sup>	2.197 <sup>195</sup>	54.10 <sup>38</sup>	59.305 <sup>203</sup>	31.24 <sup>16</sup>	38.349 <sup>159</sup>	60.23 <sup>12</sup>
20.2	1.471 <sup>153</sup>	47.56 <sup>67</sup>	2.002 <sup>177</sup>	53.72 <sup>75</sup>	59.102 <sup>179</sup>	31.08 <sup>38</sup>	38.190 <sup>141</sup>	60.35 <sup>11</sup>
30.2	1.318 <sup>126</sup>	46.89 <sup>93</sup>	1.825 <sup>151</sup>	52.97 <sup>110</sup>	58.923 <sup>147</sup>	30.70 <sup>58</sup>	38.049 <sup>113</sup>	60.46 <sup>11</sup>
May 10.2	1.192 <sup>96</sup>	45.96 <sup>119</sup>	1.674 <sup>118</sup>	51.87 <sup>141</sup>	58.776 <sup>106</sup>	30.12 <sup>76</sup>	37.936 <sup>81</sup>	60.57 <sup>13</sup>
20.1	1.096 <sup>60</sup>	44.77 <sup>141</sup>	1.556 <sup>83</sup>	50.46 <sup>172</sup>	58.670 <sup>61</sup>	29.36 <sup>90</sup>	37.855 <sup>47</sup>	60.70 <sup>13</sup>
30.1	1.036 <sup>23</sup>	43.36 <sup>161</sup>	1.473 <sup>46</sup>	48.74 <sup>195</sup>	58.609 <sup>13</sup>	28.46 <sup>102</sup>	37.808 <sup>6</sup>	60.83 <sup>14</sup>
June 9.1	1.013 <sup>15</sup>	41.75 <sup>176</sup>	1.427 <sup>6</sup>	46.79 <sup>215</sup>	58.596 <sup>36</sup>	27.44 <sup>110</sup>	37.802 <sup>32</sup>	60.97 <sup>16</sup>
19.1	1.028 <sup>51</sup>	39.99 <sup>186</sup>	1.421 <sup>34</sup>	44.64 <sup>229</sup>	58.632 <sup>83</sup>	26.34 <sup>115</sup>	37.834 <sup>69</sup>	61.13 <sup>17</sup>
29.0	1.079 <sup>88</sup>	38.13 <sup>192</sup>	1.455 <sup>74</sup>	42.35 <sup>235</sup>	58.715 <sup>129</sup>	25.19 <sup>118</sup>	37.903 <sup>106</sup>	61.30 <sup>17</sup>
July 9.0	1.167 <sup>123</sup>	36.21 <sup>191</sup>	1.529 <sup>111</sup>	40.00 <sup>236</sup>	58.844 <sup>172</sup>	24.01 <sup>116</sup>	38.009 <sup>139</sup>	61.47 <sup>16</sup>
19.0	1.290 <sup>155</sup>	34.30 <sup>184</sup>	1.640 <sup>145</sup>	37.64 <sup>229</sup>	59.016 <sup>211</sup>	22.85 <sup>115</sup>	38.148 <sup>171</sup>	61.63 <sup>14</sup>
28.9	1.445 <sup>183</sup>	32.46 <sup>169</sup>	1.785 <sup>178</sup>	35.35 <sup>213</sup>	59.227 <sup>246</sup>	21.70 <sup>113</sup>	38.319 <sup>199</sup>	61.77 <sup>9</sup>
Aug. 7.9	1.628 <sup>210</sup>	30.77 <sup>150</sup>	1.963 <sup>209</sup>	33.22 <sup>191</sup>	59.473 <sup>277</sup>	20.57 <sup>109</sup>	38.518 <sup>223</sup>	61.86 <sup>2</sup>
17.9	1.838 <sup>233</sup>	29.27 <sup>122</sup>	2.172 <sup>235</sup>	31.31 <sup>159</sup>	59.750 <sup>305</sup>	19.48 <sup>103</sup>	38.741 <sup>246</sup>	61.88 <sup>8</sup>
27.9	2.071 <sup>254</sup>	28.05 <sup>90</sup>	2.407 <sup>259</sup>	29.72 <sup>122</sup>	60.055 <sup>829</sup>	18.45 <sup>97</sup>	38.987 <sup>266</sup>	61.80 <sup>20</sup>
Sept. 6.8	2.325 <sup>270</sup>	27.15 <sup>52</sup>	2.666 <sup>279</sup>	28.50 <sup>78</sup>	60.384 <sup>349</sup>	17.48 <sup>90</sup>	39.253 <sup>281</sup>	61.60 <sup>32</sup>
16.8	2.595 <sup>283</sup>	26.63 <sup>11</sup>	2.945 <sup>294</sup>	27.72 <sup>30</sup>	60.733 <sup>364</sup>	16.58 <sup>83</sup>	39.534 <sup>295</sup>	61.28 <sup>46</sup>
26.8	2.878 <sup>294</sup>	26.52 <sup>32</sup>	3.239 <sup>306</sup>	27.42 <sup>21</sup>	61.097 <sup>377</sup>	15.75 <sup>73</sup>	39.829 <sup>307</sup>	60.82 <sup>61</sup>
Oct. 6.8	3.172 <sup>299</sup>	26.84 <sup>77</sup>	3.545 <sup>312</sup>	27.63 <sup>73</sup>	61.474 <sup>385</sup>	15.02 <sup>63</sup>	40.136 <sup>313</sup>	60.21 <sup>75</sup>
16.7	3.471 <sup>299</sup>	27.61 <sup>119</sup>	3.857 <sup>313</sup>	28.36 <sup>124</sup>	61.859 <sup>387</sup>	14.39 <sup>51</sup>	40.449 <sup>316</sup>	59.46 <sup>85</sup>
26.7	3.770 <sup>295</sup>	28.80 <sup>158</sup>	4.170 <sup>306</sup>	29.60 <sup>171</sup>	62.246 <sup>383</sup>	13.88 <sup>36</sup>	40.765 <sup>314</sup>	58.61 <sup>94</sup>
Nov. 5.7	4.065 <sup>283</sup>	30.38 <sup>191</sup>	4.476 <sup>294</sup>	31.31 <sup>213</sup>	62.629 <sup>373</sup>	13.52 <sup>18</sup>	41.079 <sup>305</sup>	57.67 <sup>100</sup>
15.6	4.348 <sup>264</sup>	32.29 <sup>219</sup>	4.770 <sup>274</sup>	33.44 <sup>249</sup>	63.002 <sup>352</sup>	13.34 <sup>0</sup>	41.384 <sup>291</sup>	56.67 <sup>101</sup>
25.6	4.612 <sup>238</sup>	34.48 <sup>238</sup>	5.044 <sup>244</sup>	35.93 <sup>274</sup>	63.354 <sup>324</sup>	13.34 <sup>21</sup>	41.675 <sup>267</sup>	55.66 <sup>98</sup>
Dec. 5.6	4.850 <sup>205</sup>	36.86 <sup>249</sup>	5.288 <sup>208</sup>	38.67 <sup>291</sup>	63.678 <sup>286</sup>	13.55 <sup>41</sup>	41.942 <sup>238</sup>	54.68 <sup>91</sup>
15.6	5.055 <sup>165</sup>	39.35 <sup>252</sup>	5.496 <sup>165</sup>	41.58 <sup>299</sup>	63.964 <sup>238</sup>	13.96 <sup>59</sup>	42.180 <sup>200</sup>	53.77 <sup>81</sup>
25.5	5.220 <sup>120</sup>	41.87 <sup>248</sup>	5.661 <sup>117</sup>	44.57 <sup>298</sup>	64.202 <sup>184</sup>	14.55 <sup>78</sup>	42.380 <sup>155</sup>	52.96 <sup>66</sup>
35.5	5.340	44.35	5.778	47.55	64.386	15.33	42.535	52.30
Mean Place	0.220	35.28	0.931	38.37	56.990	25.69	36.417	62.98
Sec δ, Tan δ	1.038	-0.277	1.115	-0.493	1.295	+0.823	1.042	+0.292
Dψ a, Dω a	+0.05	0.00	+0.05	-0.01	+0.08	+0.02	+0.08	+0.01
Dψ δ, Dω δ	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^2$ Volantis. Mag. 3.9		$\lambda$ Geminorum. Mag. 3.6		$\pi$ Argus. Mag. 2.7		$\delta$ Geminorum. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 9	° ' -70 21	h m 7 13	° ' +16 41	h m 7 14	° ' -36 56	h m 7 15	° ' +22 7
	s	"	s	"	s	"	s	"
Jan. 0.5	30.97	48.87	22.027	26.05	15.015	51.65	12.738	68.23
10.5	30.96	52.69	22.161	25.47	15.102	54.99	12.878	67.99
20.5	30.83	56.40	22.243	25.03	15.130	58.19	12.966	67.89
30.4	30.56	59.89	22.273	24.73	15.100	61.16	13.000	67.92
Feb. 9.4	30.19	63.08	22.252	24.57	15.016	63.84	12.981	68.05
19.4	29.72	65.91	22.184	24.51	14.882	66.18	12.913	68.26
Mar. 1.4	29.17	68.30	22.076	24.53	14.706	68.11	12.803	68.52
11.3	28.55	70.21	21.937	24.60	14.498	69.62	12.661	68.78
21.3	27.89	71.60	21.776	24.71	14.268	70.69	12.495	69.01
31.3	27.20	72.47	21.605	24.84	14.026	71.30	12.319	69.21
Apr. 10.3	26.51	72.80	21.434	24.96	13.783	71.45	12.143	69.36
20.2	25.84	72.61	21.274	25.08	13.549	71.16	11.977	69.44
30.2	25.20	71.90	21.131	25.20	13.335	70.43	11.829	69.47
May 10.2	24.60	70.68	21.015	25.31	13.145	69.28	11.708	69.43
20.1	24.07	68.99	20.932	25.42	12.988	67.76	11.619	69.35
30.1	23.61	66.87	20.883	25.54	12.868	65.90	11.568	69.24
June 9.1	23.24	64.39	20.872	25.66	12.789	63.72	11.556	69.10
19.1	22.97	61.61	20.899	25.79	12.752	61.31	11.583	68.94
29.0	22.81	58.58	20.964	25.94	12.758	58.71	11.649	68.77
July 9.0	22.75	55.43	21.066	26.07	12.808	56.02	11.753	68.58
19.0	22.78	52.22	21.200	26.20	12.900	53.30	11.891	68.38
29.0	22.94	49.04	21.367	26.30	13.034	50.65	12.062	68.15
Aug. 7.9	23.21	46.03	21.561	26.35	13.206	48.15	12.263	67.89
17.9	23.57	43.26	21.782	26.32	13.415	45.88	12.489	67.58
27.9	24.02	40.84	22.024	26.20	13.655	43.94	12.740	67.22
Sept. 6.8	24.55	38.86	22.287	25.96	13.926	42.41	13.010	66.78
16.8	25.15	37.42	22.566	25.60	14.222	41.35	13.299	66.25
26.8	25.80	36.56	22.860	25.10	14.537	40.83	13.603	65.63
Oct. 6.8	26.48	36.33	23.167	24.47	14.867	40.88	13.919	64.92
16.7	27.18	36.78	23.480	23.69	15.205	41.50	14.243	64.15
26.7	27.86	37.89	23.797	22.81	15.545	42.70	14.571	63.32
Nov. 5.7	28.51	39.63	24.114	21.85	15.879	44.45	14.899	62.47
15.7	29.11	41.97	24.422	20.84	16.198	46.69	15.219	61.62
25.6	29.63	44.82	24.717	19.82	16.493	49.36	15.524	60.81
Dec. 5.6	30.06	48.07	24.989	18.83	16.755	52.36	15.808	60.09
15.6	30.37	51.65	25.231	17.92	16.977	55.58	16.060	59.47
25.5	30.57	55.41	25.436	17.11	17.151	58.94	16.274	58.98
35.5	30.64	59.24	25.596	16.45	17.272	62.31	16.443	58.64
Mean Place	27.280	51.69	19.471	27.81	12.680	52.95	10.085	70.35
Sec $\delta$ , Tan $\delta$	2.976	-2.803	1.044	+0.300	1.251	-0.752	1.080	+0.407
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	-0.01	-0.06	+0.07	+0.01	+0.04	-0.02	+0.07	+0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.1	+1.0	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Canis Minoris. Mag. 3.1		$\rho$ Geminorum. Mag. 4.2		$\sigma$ Argus. Mag. 3.3		$\alpha^2$ Geminorum. (Castor.) Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 22 s	° ' " + 8 27 "	h m 7 23 s	° ' " +31 56 "	h m 7 26 s	° ' " -43 7 "	h m 7 29 s	° ' " +32 4 "
Jan. 0.5	41.479	25.14	49.393	59.75	38.187	56.08	21.275	15.47
10.5	41.615 <sup>136</sup>	24.02 <sup>112</sup>	49.555 <sup>162</sup>	60.10 <sup>35</sup>	38.283 <sup>96</sup>	59.62 <sup>354</sup>	21.443 <sup>168</sup>	15.80 <sup>33</sup>
20.5	41.700 <sup>85</sup>	23.05 <sup>97</sup>	49.659 <sup>104</sup>	60.60 <sup>50</sup>	38.316 <sup>33</sup>	63.05 <sup>343</sup>	21.553 <sup>110</sup>	16.28 <sup>48</sup>
30.5	41.735 <sup>35</sup>	22.25 <sup>80</sup>	49.703 <sup>44</sup>	61.21 <sup>61</sup>	38.287 <sup>29</sup>	66.29 <sup>324</sup>	21.602 <sup>49</sup>	16.89 <sup>61</sup>
Feb. 9.4	41.720 <sup>15</sup>	21.62 <sup>63</sup>	49.691 <sup>12</sup>	61.91 <sup>70</sup>	38.197 <sup>90</sup>	69.23 <sup>294</sup>	21.594 <sup>8</sup>	17.60 <sup>71</sup>
19.4	41.659 <sup>61</sup>	21.15 <sup>47</sup>	49.624 <sup>67</sup>	62.63 <sup>72</sup>	38.052 <sup>145</sup>	71.83 <sup>260</sup>	21.532 <sup>62</sup>	18.33 <sup>73</sup>
Mar. 1.4	41.560 <sup>99</sup>	20.82 <sup>33</sup>	49.510 <sup>114</sup>	63.31 <sup>68</sup>	37.863 <sup>189</sup>	74.03 <sup>220</sup>	21.422 <sup>110</sup>	19.03 <sup>70</sup>
11.3	41.428 <sup>132</sup>	20.64 <sup>18</sup>	49.360 <sup>150</sup>	63.93 <sup>62</sup>	37.635 <sup>228</sup>	75.79 <sup>176</sup>	21.275 <sup>147</sup>	19.67 <sup>64</sup>
21.3	41.275 <sup>153</sup>	20.56 <sup>8</sup>	49.182 <sup>178</sup>	64.45 <sup>52</sup>	37.381 <sup>254</sup>	77.09 <sup>130</sup>	21.099 <sup>176</sup>	20.21 <sup>54</sup>
31.3	41.110 <sup>165</sup>	20.59 <sup>3</sup>	48.991 <sup>191</sup>	64.82 <sup>37</sup>	37.113 <sup>268</sup>	77.92 <sup>83</sup>	20.909 <sup>190</sup>	20.62 <sup>41</sup>
Apr. 10.3	40.945 <sup>165</sup>	20.70 <sup>11</sup>	48.797 <sup>194</sup>	65.03 <sup>21</sup>	36.842 <sup>271</sup>	78.26 <sup>34</sup>	20.714 <sup>195</sup>	20.86 <sup>24</sup>
20.2	40.787 <sup>158</sup>	20.88 <sup>18</sup>	48.612 <sup>185</sup>	65.09 <sup>6</sup>	36.577 <sup>265</sup>	78.12 <sup>14</sup>	20.527 <sup>187</sup>	20.95 <sup>9</sup>
30.2	40.645 <sup>142</sup>	21.15 <sup>27</sup>	48.447 <sup>165</sup>	64.99 <sup>10</sup>	36.329 <sup>248</sup>	77.51 <sup>61</sup>	20.358 <sup>169</sup>	20.87 <sup>8</sup>
May 10.2	40.528 <sup>117</sup>	21.48 <sup>33</sup>	48.308 <sup>139</sup>	64.72 <sup>27</sup>	36.105 <sup>224</sup>	76.45 <sup>106</sup>	20.216 <sup>142</sup>	20.62 <sup>25</sup>
20.2	40.439 <sup>89</sup>	21.88 <sup>40</sup>	48.204 <sup>104</sup>	64.32 <sup>40</sup>	35.912 <sup>193</sup>	74.97 <sup>148</sup>	20.108 <sup>108</sup>	20.24 <sup>38</sup>
30.1	40.384 <sup>55</sup>	22.33 <sup>45</sup>	48.139 <sup>65</sup>	63.81 <sup>51</sup>	35.757 <sup>155</sup>	73.12 <sup>185</sup>	20.037 <sup>71</sup>	19.74 <sup>50</sup>
June 9.1	40.365 <sup>19</sup>	22.84 <sup>51</sup>	48.115 <sup>24</sup>	63.21 <sup>60</sup>	35.644 <sup>113</sup>	70.94 <sup>218</sup>	20.008 <sup>29</sup>	19.13 <sup>61</sup>
19.1	40.381 <sup>16</sup>	23.39 <sup>55</sup>	48.134 <sup>19</sup>	62.52 <sup>69</sup>	35.576 <sup>68</sup>	68.46 <sup>248</sup>	20.020 <sup>12</sup>	18.43 <sup>70</sup>
29.0	40.432 <sup>51</sup>	23.98 <sup>59</sup>	48.195 <sup>61</sup>	61.79 <sup>73</sup>	35.555 <sup>21</sup>	65.78 <sup>268</sup>	20.075 <sup>55</sup>	17.68 <sup>75</sup>
July 9.0	40.519 <sup>87</sup>	24.57 <sup>59</sup>	48.296 <sup>101</sup>	61.02 <sup>77</sup>	35.580 <sup>25</sup>	62.97 <sup>281</sup>	20.169 <sup>94</sup>	16.88 <sup>80</sup>
19.0	40.639 <sup>120</sup>	25.15 <sup>58</sup>	48.436 <sup>140</sup>	60.22 <sup>80</sup>	35.651 <sup>71</sup>	60.11 <sup>286</sup>	20.303 <sup>134</sup>	16.05 <sup>83</sup>
29.0	40.788 <sup>149</sup>	25.68 <sup>53</sup>	48.613 <sup>177</sup>	59.40 <sup>82</sup>	35.769 <sup>118</sup>	57.28 <sup>283</sup>	20.473 <sup>170</sup>	15.20 <sup>85</sup>
Aug. 7.9	40.966 <sup>178</sup>	26.14 <sup>46</sup>	48.822 <sup>209</sup>	58.57 <sup>83</sup>	35.931 <sup>162</sup>	54.58 <sup>270</sup>	20.676 <sup>203</sup>	14.32 <sup>88</sup>
17.9	41.169 <sup>203</sup>	26.50 <sup>36</sup>	49.060 <sup>238</sup>	57.72 <sup>85</sup>	36.134 <sup>203</sup>	52.12 <sup>246</sup>	20.908 <sup>232</sup>	13.43 <sup>89</sup>
27.9	41.395 <sup>226</sup>	26.70 <sup>20</sup>	49.326 <sup>266</sup>	56.87 <sup>85</sup>	36.376 <sup>242</sup>	49.96 <sup>216</sup>	21.168 <sup>260</sup>	12.53 <sup>90</sup>
Sept. 6.9	41.641 <sup>246</sup>	26.74 <sup>4</sup>	49.614 <sup>288</sup>	56.01 <sup>86</sup>	36.652 <sup>276</sup>	48.21 <sup>175</sup>	21.451 <sup>283</sup>	11.61 <sup>92</sup>
16.8	41.906 <sup>265</sup>	26.58 <sup>16</sup>	49.923 <sup>309</sup>	55.14 <sup>87</sup>	36.959 <sup>307</sup>	46.94 <sup>127</sup>	21.757 <sup>306</sup>	10.68 <sup>93</sup>
26.8	42.186 <sup>280</sup>	26.21 <sup>37</sup>	50.249 <sup>326</sup>	54.27 <sup>87</sup>	37.290 <sup>331</sup>	46.21 <sup>73</sup>	22.080 <sup>323</sup>	9.76 <sup>92</sup>
Oct. 6.8	42.479 <sup>293</sup>	25.62 <sup>59</sup>	50.590 <sup>341</sup>	53.41 <sup>86</sup>	37.641 <sup>351</sup>	46.06 <sup>15</sup>	22.419 <sup>339</sup>	8.84 <sup>92</sup>
16.7	42.782 <sup>303</sup>	24.81 <sup>81</sup>	50.942 <sup>352</sup>	52.57 <sup>84</sup>	38.003 <sup>362</sup>	46.54 <sup>48</sup>	22.770 <sup>351</sup>	7.94 <sup>90</sup>
26.7	43.089 <sup>307</sup>	23.81 <sup>100</sup>	51.300 <sup>358</sup>	51.79 <sup>78</sup>	38.369 <sup>366</sup>	47.62 <sup>108</sup>	23.127 <sup>357</sup>	7.10 <sup>84</sup>
Nov. 5.7	43.396 <sup>307</sup>	22.63 <sup>118</sup>	51.657 <sup>357</sup>	51.09 <sup>70</sup>	38.730 <sup>361</sup>	49.28 <sup>166</sup>	23.486 <sup>359</sup>	6.34 <sup>76</sup>
15.7	43.697 <sup>301</sup>	21.33 <sup>130</sup>	52.007 <sup>350</sup>	50.49 <sup>60</sup>	39.075 <sup>345</sup>	51.49 <sup>221</sup>	23.838 <sup>352</sup>	5.69 <sup>65</sup>
25.6	43.986 <sup>289</sup>	19.94 <sup>139</sup>	52.344 <sup>337</sup>	50.02 <sup>47</sup>	39.397 <sup>322</sup>	54.17 <sup>268</sup>	24.177 <sup>339</sup>	5.17 <sup>52</sup>
Dec. 5.6	44.253 <sup>267</sup>	18.52 <sup>142</sup>	52.657 <sup>313</sup>	49.72 <sup>30</sup>	39.683 <sup>286</sup>	57.22 <sup>305</sup>	24.494 <sup>317</sup>	4.81 <sup>36</sup>
15.6	44.493 <sup>240</sup>	17.13 <sup>139</sup>	52.939 <sup>282</sup>	49.59 <sup>13</sup>	39.925 <sup>242</sup>	60.55 <sup>333</sup>	24.780 <sup>286</sup>	4.65 <sup>16</sup>
25.6	44.697 <sup>204</sup>	15.81 <sup>132</sup>	53.179 <sup>240</sup>	49.64 <sup>5</sup>	40.115 <sup>190</sup>	64.06 <sup>351</sup>	25.025 <sup>245</sup>	4.68 <sup>3</sup>
35.5	44.858 <sup>161</sup>	14.60 <sup>121</sup>	53.369 <sup>190</sup>	49.89 <sup>25</sup>	40.248 <sup>133</sup>	67.62 <sup>356</sup>	25.221 <sup>196</sup>	4.90 <sup>22</sup>
Mean Place	39.049	26.92	46.515	62.93	35.800	58.09	18.402	19.07
Sec $\delta$ , Tan $\delta$	1.011	+0.149	1.178	+0.624	1.370	-0.937	1.180	+0.627
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.07	0.00	+0.08	+0.01	+0.05	-0.02	+0.08	+0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9	-0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	25 Monocerotis. Mag. 5.2		$\alpha$ Canis Minoris. (Procyon.) Mag. 0.5		24 Lyncis. Mag. 5.0		$\kappa$ Geminorum. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 33 s	° ' " - 3 55 "	h m 7 34 s	° ' " + 5 26 "	h m 7 35 s	° ' " +58 54 "	h m 7 39 s	° ' " +24 35 "
Jan. 0.5	11.366 <sup>136</sup>	30.15 <sup>189</sup>	59.798 <sup>139</sup>	16.26 <sup>136</sup>	63.927 <sup>243</sup>	16.18 <sup>184</sup>	29.046 <sup>168</sup>	48.84 <sup>17</sup>
10.5	11.502 <sup>86</sup>	32.04 <sup>173</sup>	59.937 <sup>91</sup>	14.90 <sup>120</sup>	64.170 <sup>152</sup>	18.02 <sup>200</sup>	29.214 <sup>115</sup>	48.67 <sup>1</sup>
20.5	11.588 <sup>36</sup>	33.77 <sup>154</sup>	60.028 <sup>40</sup>	13.70 <sup>102</sup>	64.322 <sup>59</sup>	20.02 <sup>208</sup>	29.329 <sup>60</sup>	48.66 <sup>15</sup>
30.5	11.624 <sup>13</sup>	35.31 <sup>134</sup>	60.068 <sup>10</sup>	12.68 <sup>84</sup>	64.381 <sup>33</sup>	22.10 <sup>206</sup>	29.389 <sup>4</sup>	48.81 <sup>29</sup>
Feb. 9.4	11.611 <sup>58</sup>	36.65 <sup>110</sup>	60.058 <sup>56</sup>	11.84 <sup>64</sup>	64.348 <sup>119</sup>	24.16 <sup>196</sup>	29.393 <sup>48</sup>	49.10 <sup>37</sup>
19.4	11.553 <sup>97</sup>	37.75 <sup>88</sup>	60.002 <sup>95</sup>	11.20 <sup>47</sup>	64.229 <sup>198</sup>	26.12 <sup>175</sup>	29.345 <sup>93</sup>	49.47 <sup>41</sup>
Mar. 1.4	11.456 <sup>130</sup>	38.63 <sup>63</sup>	59.907 <sup>128</sup>	10.73 <sup>31</sup>	64.031 <sup>260</sup>	27.87 <sup>149</sup>	29.252 <sup>130</sup>	49.88 <sup>42</sup>
11.4	11.326 <sup>151</sup>	39.26 <sup>42</sup>	59.779 <sup>150</sup>	10.42 <sup>15</sup>	63.771 <sup>306</sup>	29.36 <sup>115</sup>	29.122 <sup>158</sup>	50.30 <sup>40</sup>
21.3	11.175 <sup>165</sup>	39.68 <sup>19</sup>	59.629 <sup>164</sup>	10.27 <sup>3</sup>	63.465 <sup>334</sup>	30.51 <sup>77</sup>	28.964 <sup>173</sup>	50.70 <sup>35</sup>
31.3	11.010 <sup>169</sup>	39.87 <sup>0</sup>	59.465 <sup>165</sup>	10.24 <sup>9</sup>	63.131 <sup>345</sup>	31.28 <sup>35</sup>	28.791 <sup>177</sup>	51.05 <sup>25</sup>
Apr. 10.3	10.841 <sup>160</sup>	39.87 <sup>21</sup>	59.300 <sup>159</sup>	10.33 <sup>20</sup>	62.786 <sup>338</sup>	31.63 <sup>6</sup>	28.614 <sup>173</sup>	51.30 <sup>18</sup>
20.2	10.681 <sup>147</sup>	39.66 <sup>39</sup>	59.141 <sup>145</sup>	10.53 <sup>29</sup>	62.448 <sup>313</sup>	31.57 <sup>47</sup>	28.441 <sup>156</sup>	51.48 <sup>9</sup>
30.2	10.534 <sup>125</sup>	39.27 <sup>57</sup>	58.996 <sup>121</sup>	10.82 <sup>37</sup>	62.135 <sup>275</sup>	31.10 <sup>86</sup>	28.285 <sup>134</sup>	51.57 <sup>1</sup>
May 10.2	10.409 <sup>99</sup>	38.70 <sup>75</sup>	58.875 <sup>94</sup>	11.19 <sup>46</sup>	61.860 <sup>226</sup>	30.24 <sup>122</sup>	28.151 <sup>104</sup>	51.56 <sup>10</sup>
20.2	10.310 <sup>67</sup>	37.95 <sup>89</sup>	58.781 <sup>62</sup>	11.65 <sup>54</sup>	61.634 <sup>167</sup>	29.02 <sup>153</sup>	28.047 <sup>70</sup>	51.46 <sup>17</sup>
30.1	10.243 <sup>35</sup>	37.06 <sup>102</sup>	58.719 <sup>28</sup>	12.19 <sup>61</sup>	61.467 <sup>103</sup>	27.49 <sup>178</sup>	27.977 <sup>33</sup>	51.29 <sup>25</sup>
June 9.1	10.208 <sup>1</sup>	36.04 <sup>112</sup>	58.691 <sup>6</sup>	12.80 <sup>66</sup>	61.364 <sup>35</sup>	25.71 <sup>199</sup>	27.944 <sup>5</sup>	51.04 <sup>29</sup>
19.1	10.207 <sup>35</sup>	34.92 <sup>121</sup>	58.697 <sup>42</sup>	13.46 <sup>69</sup>	61.329 <sup>34</sup>	23.72 <sup>215</sup>	27.949 <sup>43</sup>	50.75 <sup>34</sup>
29.1	10.242 <sup>68</sup>	33.71 <sup>124</sup>	58.739 <sup>76</sup>	14.15 <sup>70</sup>	61.363 <sup>103</sup>	21.57 <sup>224</sup>	27.992 <sup>81</sup>	50.41 <sup>37</sup>
July 9.0	10.310 <sup>100</sup>	32.47 <sup>124</sup>	58.815 <sup>109</sup>	14.85 <sup>68</sup>	61.466 <sup>168</sup>	19.33 <sup>229</sup>	28.073 <sup>116</sup>	50.04 <sup>42</sup>
19.0	10.410 <sup>131</sup>	31.23 <sup>119</sup>	58.924 <sup>137</sup>	15.53 <sup>63</sup>	61.634 <sup>231</sup>	17.04 <sup>229</sup>	28.189 <sup>149</sup>	49.62 <sup>46</sup>
29.0	10.541 <sup>160</sup>	30.04 <sup>109</sup>	59.061 <sup>167</sup>	16.16 <sup>55</sup>	61.865 <sup>288</sup>	14.75 <sup>225</sup>	28.338 <sup>180</sup>	49.16 <sup>51</sup>
Aug. 7.9	10.701 <sup>185</sup>	28.95 <sup>95</sup>	59.228 <sup>192</sup>	16.71 <sup>43</sup>	62.153 <sup>341</sup>	12.50 <sup>216</sup>	28.518 <sup>209</sup>	48.65 <sup>56</sup>
17.9	10.886 <sup>210</sup>	28.00 <sup>74</sup>	59.420 <sup>216</sup>	17.14 <sup>27</sup>	62.494 <sup>390</sup>	10.34 <sup>204</sup>	28.727 <sup>234</sup>	48.09 <sup>62</sup>
27.9	11.096 <sup>232</sup>	27.26 <sup>51</sup>	59.636 <sup>237</sup>	17.41 <sup>8</sup>	62.884 <sup>433</sup>	8.30 <sup>189</sup>	28.961 <sup>259</sup>	47.47 <sup>70</sup>
Sept. 6.9	11.328 <sup>253</sup>	26.75 <sup>21</sup>	59.873 <sup>257</sup>	17.49 <sup>14</sup>	63.317 <sup>469</sup>	6.41 <sup>169</sup>	29.220 <sup>279</sup>	46.77 <sup>77</sup>
16.8	11.581 <sup>269</sup>	26.54 <sup>10</sup>	60.130 <sup>272</sup>	17.35 <sup>38</sup>	63.786 <sup>501</sup>	4.72 <sup>147</sup>	29.499 <sup>299</sup>	46.00 <sup>84</sup>
26.8	11.850 <sup>283</sup>	26.64 <sup>42</sup>	60.402 <sup>287</sup>	16.97 <sup>63</sup>	64.287 <sup>526</sup>	3.25 <sup>122</sup>	29.798 <sup>314</sup>	45.16 <sup>90</sup>
Oct. 6.8	12.133 <sup>294</sup>	27.06 <sup>77</sup>	60.689 <sup>297</sup>	16.34 <sup>86</sup>	64.813 <sup>546</sup>	2.03 <sup>95</sup>	30.112 <sup>326</sup>	44.26 <sup>96</sup>
16.8	12.427 <sup>300</sup>	27.83 <sup>109</sup>	60.986 <sup>305</sup>	15.48 <sup>111</sup>	65.359 <sup>555</sup>	1.08 <sup>63</sup>	30.438 <sup>335</sup>	43.30 <sup>99</sup>
26.7	12.727 <sup>303</sup>	28.92 <sup>138</sup>	61.291 <sup>304</sup>	14.37 <sup>130</sup>	65.914 <sup>555</sup>	0.45 <sup>29</sup>	30.773 <sup>339</sup>	42.31 <sup>100</sup>
Nov. 5.7	13.030 <sup>297</sup>	30.30 <sup>164</sup>	61.595 <sup>300</sup>	13.07 <sup>146</sup>	66.469 <sup>543</sup>	0.16 <sup>4</sup>	31.112 <sup>335</sup>	41.31 <sup>95</sup>
15.7	13.327 <sup>286</sup>	31.94 <sup>183</sup>	61.895 <sup>289</sup>	11.61 <sup>157</sup>	67.012 <sup>521</sup>	0.20 <sup>42</sup>	31.447 <sup>324</sup>	40.36 <sup>88</sup>
25.6	13.613 <sup>266</sup>	33.77 <sup>196</sup>	62.184 <sup>269</sup>	10.04 <sup>162</sup>	67.533 <sup>483</sup>	0.62 <sup>78</sup>	31.771 <sup>305</sup>	39.48 <sup>78</sup>
Dec. 5.6	13.879 <sup>239</sup>	35.73 <sup>203</sup>	62.453 <sup>243</sup>	8.42 <sup>161</sup>	68.016 <sup>432</sup>	1.40 <sup>113</sup>	32.076 <sup>277</sup>	38.70 <sup>62</sup>
15.6	14.118 <sup>202</sup>	37.76 <sup>202</sup>	62.696 <sup>207</sup>	6.81 <sup>156</sup>	68.448 <sup>367</sup>	2.53 <sup>144</sup>	32.353 <sup>240</sup>	38.08 <sup>47</sup>
25.6	14.320 <sup>161</sup>	39.78 <sup>196</sup>	62.903 <sup>165</sup>	5.25 <sup>145</sup>	68.815 <sup>291</sup>	3.97 <sup>172</sup>	32.593 <sup>196</sup>	37.61 <sup>28</sup>
35.5	14.481	41.74	63.068	3.80	69.106	5.69	32.789	37.33
Mean Place	9.064	28.96	57.476	18.37	59.578	21.49	26.375	52.70
Sec $\delta$ , Tan $\delta$	1.002	-0.069	1.005	+0.095	1.936	+1.658	1.100	+0.458
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	0.00	+0.06	0.00	+0.10	+0.04	+0.07	+0.07
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Geminorum. (Pollux.) Mag. 1.2		$\delta$ Puppis. Mag. 5.1		$\xi$ Argus. Mag. 3.5		$\phi$ Geminorum. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 40	° ' " +28 13	h m 7 42	° ' " -14 21	h m 7 45	° ' " -24 38	h m 7 48	° ' " +26 58
	s	"	s	"	s	"	s	"
Jan. 0.5	17.122 <sup>172</sup>	35.45 <sup>4</sup>	9.801 <sup>136</sup>	40.95 <sup>247</sup>	50.435 <sup>135</sup>	61.87 <sup>295</sup>	27.940 <sup>181</sup>	49.50 <sup>7</sup>
10.5	17.294 <sup>118</sup>	35.49 <sup>24</sup>	9.937 <sup>87</sup>	43.42 <sup>234</sup>	50.570 <sup>82</sup>	64.82 <sup>284</sup>	28.121 <sup>127</sup>	49.43 <sup>12</sup>
20.5	17.412 <sup>61</sup>	35.73 <sup>37</sup>	10.024 <sup>37</sup>	45.76 <sup>213</sup>	50.652 <sup>28</sup>	67.66 <sup>265</sup>	28.248 <sup>70</sup>	49.55 <sup>29</sup>
30.5	17.473 <sup>4</sup>	36.10 <sup>48</sup>	10.061 <sup>14</sup>	47.89 <sup>191</sup>	50.680 <sup>24</sup>	70.31 <sup>241</sup>	28.318 <sup>13</sup>	49.84 <sup>41</sup>
Feb. 9.4	17.477 <sup>50</sup>	36.58 <sup>56</sup>	10.047 <sup>61</sup>	49.80 <sup>163</sup>	50.656 <sup>72</sup>	72.72 <sup>210</sup>	28.331 <sup>40</sup>	50.25 <sup>50</sup>
19.4	17.427 <sup>98</sup>	37.14 <sup>58</sup>	9.986 <sup>100</sup>	51.43 <sup>136</sup>	50.584 <sup>114</sup>	74.82 <sup>178</sup>	28.291 <sup>87</sup>	50.75 <sup>55</sup>
Mar. 1.4	17.329 <sup>135</sup>	37.72 <sup>56</sup>	9.886 <sup>134</sup>	52.79 <sup>104</sup>	50.470 <sup>148</sup>	76.60 <sup>143</sup>	28.204 <sup>126</sup>	51.30 <sup>55</sup>
11.4	17.194 <sup>164</sup>	38.28 <sup>50</sup>	9.752 <sup>158</sup>	53.83 <sup>74</sup>	50.322 <sup>174</sup>	78.03 <sup>105</sup>	28.078 <sup>156</sup>	51.85 <sup>51</sup>
21.3	17.030 <sup>180</sup>	38.78 <sup>42</sup>	9.594 <sup>171</sup>	54.57 <sup>45</sup>	50.148 <sup>189</sup>	79.08 <sup>68</sup>	27.922 <sup>174</sup>	52.36 <sup>43</sup>
31.3	16.850 <sup>185</sup>	39.20 <sup>29</sup>	9.423 <sup>176</sup>	55.02 <sup>14</sup>	49.959 <sup>195</sup>	79.76 <sup>31</sup>	27.748 <sup>180</sup>	52.79 <sup>34</sup>
Apr. 10.3	16.665 <sup>180</sup>	39.49 <sup>16</sup>	9.247 <sup>172</sup>	55.16 <sup>15</sup>	49.764 <sup>191</sup>	80.07 <sup>7</sup>	27.568 <sup>176</sup>	53.13 <sup>21</sup>
20.2	16.485 <sup>164</sup>	39.65 <sup>4</sup>	9.075 <sup>158</sup>	55.01 <sup>42</sup>	49.573 <sup>179</sup>	80.00 <sup>42</sup>	27.392 <sup>162</sup>	53.34 <sup>10</sup>
30.2	16.321 <sup>141</sup>	39.69 <sup>9</sup>	8.917 <sup>140</sup>	54.59 <sup>70</sup>	49.394 <sup>159</sup>	79.58 <sup>77</sup>	27.230 <sup>141</sup>	53.44 <sup>2</sup>
May 10.2	16.180 <sup>110</sup>	39.60 <sup>21</sup>	8.777 <sup>113</sup>	53.89 <sup>94</sup>	49.235 <sup>135</sup>	78.81 <sup>110</sup>	27.089 <sup>112</sup>	53.42 <sup>14</sup>
20.2	16.070 <sup>75</sup>	39.39 <sup>32</sup>	8.664 <sup>84</sup>	52.95 <sup>118</sup>	49.100 <sup>104</sup>	77.71 <sup>138</sup>	26.977 <sup>78</sup>	53.28 <sup>24</sup>
30.1	15.995 <sup>37</sup>	39.07 <sup>40</sup>	8.580 <sup>53</sup>	51.77 <sup>136</sup>	48.996 <sup>72</sup>	76.33 <sup>166</sup>	26.899 <sup>43</sup>	53.04 <sup>33</sup>
June 9.1	15.958 <sup>1</sup>	38.67 <sup>47</sup>	8.527 <sup>17</sup>	50.41 <sup>152</sup>	48.924 <sup>36</sup>	74.67 <sup>187</sup>	26.856 <sup>4</sup>	52.71 <sup>41</sup>
19.1	15.959 <sup>42</sup>	38.20 <sup>54</sup>	8.510 <sup>17</sup>	48.89 <sup>166</sup>	48.888 <sup>1</sup>	72.80 <sup>203</sup>	26.852 <sup>35</sup>	52.30 <sup>46</sup>
29.1	16.001 <sup>81</sup>	37.66 <sup>59</sup>	8.527 <sup>50</sup>	47.23 <sup>172</sup>	48.887 <sup>36</sup>	70.77 <sup>215</sup>	26.887 <sup>73</sup>	51.84 <sup>53</sup>
July 9.0	16.082 <sup>117</sup>	37.07 <sup>64</sup>	8.577 <sup>85</sup>	45.51 <sup>175</sup>	48.923 <sup>72</sup>	68.62 <sup>219</sup>	26.960 <sup>109</sup>	51.31 <sup>58</sup>
19.0	16.199 <sup>152</sup>	36.43 <sup>67</sup>	8.662 <sup>117</sup>	43.76 <sup>170</sup>	48.995 <sup>107</sup>	66.43 <sup>216</sup>	27.069 <sup>142</sup>	50.73 <sup>64</sup>
29.0	16.351 <sup>183</sup>	35.76 <sup>73</sup>	8.779 <sup>146</sup>	42.06 <sup>159</sup>	49.102 <sup>140</sup>	64.27 <sup>205</sup>	27.211 <sup>175</sup>	50.09 <sup>69</sup>
Aug. 7.9	16.534 <sup>213</sup>	35.03 <sup>75</sup>	8.925 <sup>176</sup>	40.47 <sup>143</sup>	49.242 <sup>172</sup>	62.22 <sup>188</sup>	27.386 <sup>204</sup>	49.40 <sup>73</sup>
17.9	16.747 <sup>240</sup>	34.28 <sup>80</sup>	9.101 <sup>202</sup>	39.04 <sup>120</sup>	49.414 <sup>202</sup>	60.34 <sup>162</sup>	27.590 <sup>231</sup>	48.67 <sup>79</sup>
27.9	16.987 <sup>265</sup>	33.48 <sup>82</sup>	9.303 <sup>226</sup>	37.84 <sup>92</sup>	49.616 <sup>228</sup>	58.72 <sup>129</sup>	27.821 <sup>257</sup>	47.88 <sup>84</sup>
Sept. 6.9	17.252 <sup>285</sup>	32.63 <sup>89</sup>	9.529 <sup>249</sup>	36.92 <sup>56</sup>	49.844 <sup>255</sup>	57.43 <sup>90</sup>	28.078 <sup>278</sup>	47.04 <sup>91</sup>
16.8	17.537 <sup>306</sup>	31.74 <sup>93</sup>	9.778 <sup>268</sup>	36.36 <sup>18</sup>	50.099 <sup>275</sup>	56.53 <sup>46</sup>	28.356 <sup>300</sup>	46.13 <sup>96</sup>
26.8	17.843 <sup>322</sup>	30.81 <sup>96</sup>	10.046 <sup>284</sup>	36.18 <sup>24</sup>	50.374 <sup>294</sup>	56.07 <sup>3</sup>	28.656 <sup>316</sup>	45.17 <sup>101</sup>
Oct. 6.8	18.165 <sup>335</sup>	29.85 <sup>98</sup>	10.330 <sup>296</sup>	36.42 <sup>67</sup>	50.668 <sup>309</sup>	56.10 <sup>53</sup>	28.972 <sup>331</sup>	44.16 <sup>104</sup>
16.8	18.500 <sup>343</sup>	28.87 <sup>97</sup>	10.626 <sup>305</sup>	37.09 <sup>108</sup>	50.977 <sup>316</sup>	56.63 <sup>104</sup>	29.303 <sup>340</sup>	43.12 <sup>104</sup>
26.7	18.843 <sup>347</sup>	27.90 <sup>94</sup>	10.931 <sup>307</sup>	38.17 <sup>148</sup>	51.293 <sup>318</sup>	57.67 <sup>151</sup>	29.643 <sup>345</sup>	42.08 <sup>102</sup>
Nov. 5.7	19.190 <sup>344</sup>	26.96 <sup>86</sup>	11.238 <sup>301</sup>	39.65 <sup>182</sup>	51.611 <sup>313</sup>	59.18 <sup>195</sup>	29.988 <sup>344</sup>	41.06 <sup>96</sup>
15.7	19.534 <sup>333</sup>	26.10 <sup>75</sup>	11.539 <sup>290</sup>	41.47 <sup>212</sup>	51.924 <sup>299</sup>	61.13 <sup>232</sup>	30.332 <sup>334</sup>	40.10 <sup>87</sup>
25.6	19.867 <sup>313</sup>	25.35 <sup>61</sup>	11.829 <sup>270</sup>	43.59 <sup>234</sup>	52.223 <sup>277</sup>	63.45 <sup>263</sup>	30.666 <sup>316</sup>	39.23 <sup>72</sup>
Dec. 5.6	20.180 <sup>284</sup>	24.74 <sup>45</sup>	12.099 <sup>242</sup>	45.93 <sup>248</sup>	52.500 <sup>246</sup>	66.08 <sup>283</sup>	30.982 <sup>289</sup>	38.51 <sup>57</sup>
15.6	20.464 <sup>246</sup>	24.29 <sup>26</sup>	12.341 <sup>206</sup>	48.41 <sup>253</sup>	52.746 <sup>208</sup>	68.91 <sup>295</sup>	31.271 <sup>252</sup>	37.94 <sup>38</sup>
25.6	20.710 <sup>201</sup>	24.03 <sup>7</sup>	12.546 <sup>163</sup>	50.94 <sup>253</sup>	52.954 <sup>162</sup>	71.86 <sup>297</sup>	31.523 <sup>208</sup>	37.56 <sup>18</sup>
35.5	20.911	23.96	12.709	53.47	53.116	74.83	31.731	37.38
Mean Place	14.369	39.63	7.563	40.59	48.212	62.57	25.235	54.15
Sec $\delta$ , Tan $\delta$	1.135	+0.537	1.032	-0.256	1.100	-0.459	1.122	+0.509
$D_{\psi} a, D_{\omega} a$	+0.07	+0.02	+0.05	-0.01	+0.05	-0.01	+0.07	+0.02
$D_{\psi} \delta, D_{\omega} \delta$	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	80 Monocerotis. Mag. 4.0			θ Chamseleontis. Mag. 4.3			ο Ursæ Majoris. Mag. 3.5			Groombridge 1450. Mag. 6.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	8	21	— 3 38	8	23	—77 12	8	23	+60 59	8	27	+38 17
	s		"	s		"	s		"	s		"
Jan. 0.6	33.077	181	7.88	13.60	27	55.33	27.29	34	38.51	34.451	242	58.47
10.5	33.258	134	9.88	13.87	8	59.13	27.63	24	40.19	34.693	184	58.89
20.5	33.392	85	11.73	13.95	12	63.03	27.87	15	42.14	34.877	121	59.59
30.5	33.477	33	13.39	13.83	30	66.91	28.02	5	44.28	34.998	57	60.49
Feb. 9.5	33.510	15	14.85	13.53	46	70.67	28.07	5	46.51	35.055	6	61.55
			121			354			223			117
19.4	33.495		16.06	13.07		74.21	28.02		48.74	35.049		62.72
Mar. 1.4	33.437	58	17.04	12.45	62	77.48	27.88	14	50.86	34.986	63	63.92
11.4	33.342	95	17.78	11.71	74	80.39	27.67	21	52.79	34.872	114	65.08
21.4	33.217	125	18.30	10.87	84	82.88	27.39	28	54.43	34.719	153	66.15
31.3	33.074	143	18.59	9.94	93	84.91	27.06	33	55.73	34.539	180	67.06
		154	10		98	155		35	90		198	72
Apr. 10.3	32.920		18.69	8.96		86.46	26.71		56.63	34.341		67.78
20.3	32.764	156	18.59	7.95	101	87.49	26.34	37	57.11	34.139	202	68.29
30.2	32.615	149	18.30	6.93	102	87.98	25.99	35	57.14	33.944	195	68.54
May 10.2	32.479	136	17.85	5.94	99	87.94	25.66	33	56.74	33.764	180	68.55
20.2	32.364	115	17.25	4.99	95	87.37	25.36	30	55.91	33.610	154	68.32
		90	75		88	108		24	121		124	46
30.2	32.274		16.50	4.11		86.29	25.12		54.70	33.486		67.86
June 9.1	32.209	65	15.64	3.31	80	84.72	24.93	19	53.14	33.398	88	67.18
19.1	32.175	34	14.67	2.62	69	82.73	24.80	13	51.29	33.347	51	66.32
29.1	32.170	5	13.62	2.07	55	80.36	24.75	5	49.18	33.337	10	65.30
July 9.1	32.197	27	12.53	1.65	42	77.66	24.76	1	46.88	33.367	30	64.12
		57	109		27	292		8	245		70	129
19.0	32.254		11.44	1.38		74.74	24.84		44.43	33.437		62.83
29.0	32.340	86	10.39	1.27	11	71.67	24.98	14	41.89	33.546	109	61.44
Aug. 8.0	32.455	115	9.42	1.33	6	68.56	25.18	20	39.30	33.691	145	59.97
17.9	32.598	143	8.57	1.55	22	65.52	25.45	27	36.73	33.873	182	58.43
27.9	32.769	171	7.91	1.95	40	62.63	25.78	33	34.20	34.088	215	56.85
		197	44		55	260		38	243		247	160
Sept. 6.9	32.966		7.47	2.50		60.03	26.16		31.77	34.335		55.25
16.9	33.188	222	7.30	3.20	70	57.81	26.60	44	29.48	34.612	277	53.64
26.8	33.432	244	7.43	4.02	82	56.06	27.07	47	27.38	34.919	307	52.04
Oct. 6.8	33.699	267	7.88	4.94	92	54.85	27.58	51	25.50	35.250	331	50.47
16.8	33.983	284	8.66	5.94	100	54.26	28.13	55	23.90	35.605	355	48.97
		300	111		103	8		57	129		372	139
26.8	34.283		9.77	6.97		54.34	28.70		22.61	35.977		47.58
Nov. 5.7	34.592	309	11.17	8.02	105	55.07	29.28	58	21.66	36.363	388	46.32
15.7	34.903	311	12.84	9.03	101	56.47	29.87	59	21.11	36.754	391	45.25
25.7	35.210	307	14.71	9.97	94	58.47	30.45	58	20.96	37.142	388	44.39
Dec. 5.6	35.506	296	16.73	10.82	85	61.03	31.00	55	21.24	37.517	375	43.79
		274	211		70	304		51	71		350	32
15.6	35.780		18.84	11.52		64.07	31.51		21.95	37.867		43.47
25.6	36.023	243	20.95	12.08	56	67.49	31.95	44	23.06	38.182	315	43.43
35.6	36.228	205	23.01	12.46	38	71.17	32.34	39	24.54	38.453	271	43.69
			206			368			148			26
Mean Place	30.868		5.42	9.121		62.21	22.930		48.78	31.536		67.19
Sec δ, Tan δ	1.002		—0.064	4.520		—4.409	2.063		+1.804	1.274		+0.790
Dψ α, Dω α	+0.06		0.00	—0.03		—0.17	+0.10		+0.07	+0.08		+0.03
Dψ δ, Dω δ	—0.2		+0.8	—0.2		+0.8	—0.2		+0.8	—0.2		+0.8



i

FOR THE UPPER TRANSIT AT WASHINGTON.



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Hydræ. Mag. 3.5			δ Argus. Mag. 2.0			σ <sup>2</sup> Cancri ( <i>mean</i> ). Mag. 5.5			ζ Hydræ. Mag. 3.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	8	42	+ 6 43	8	42	-54 24	8	49	+30 53	8	51	+ 6 15
	s		"	s		"	s		"	s		"
Jan. 0.6	25.176		22.07	26.884		8.94	13.700		31.17	2.708		38.69
10.6	25.384	208	20.58 149	27.099	215	12.70 376	13.947	247	31.05 12	2.923	215	37.15 154
20.5	25.545	161	19.28 130	27.239	140	16.53 383	14.143	196	31.20 15	3.093	170	35.79 136
30.5	25.657	112	18.19 109	27.302	63	20.33 380	14.281	138	31.60 40	3.213	120	34.66 113
Feb. 9.5	25.717	60	17.31 88	27.288	14	23.99 366	14.361	80	32.21 61	3.281	68	33.73 93
		11	66		86	343		22	78		19	69
19.5	25.728		16.65	27.202		27.42	14.383		32.99	3.300		33.04
Mar. 1.4	25.692	36	16.19 46	27.052	150	30.56 314	14.351	32	33.86 87	3.272	28	32.55 49
11.4	25.617	75	15.93 26	26.844	208	33.35 279	14.269	82	34.79 93	3.203	69	32.26 29
21.4	25.509	108	15.81 12	26.590	254	35.72 237	14.149	120	35.70 91	3.103	100	32.13 13
31.3	25.379	130	15.84 3	26.300	290	37.64 192	14.001	148	36.56 86	2.977	126	32.15 2
		145	15		313	144		168	74		141	13
Apr. 10.3	25.234		15.99	25.987		39.08	13.833		37.30	2.836		32.28
20.3	25.085	149	16.24 25	25.664	323	40.01 93	13.658	175	37.90 60	2.690	146	32.53 25
30.3	24.939	146	16.55 31	25.338	326	40.44 43	13.485	173	38.35 45	2.546	144	32.85 32
May 10.2	24.804	135	16.93 38	25.021	317	40.36 8	13.324	161	38.60 25	2.411	135	33.24 39
20.2	24.687	117	17.37 44	24.724	297	39.78 58	13.179	145	38.67 7	2.292	119	33.69 45
		97	48		273	106		118	11		99	48
30.2	24.590		17.85	24.451		38.72	13.061		38.56	2.193		34.17
June 9.2	24.520	70	18.36 51	24.212	239	37.21 151	12.970	91	38.26 30	2.119	74	34.69 52
19.1	24.476	44	18.88 52	24.012	200	35.30 191	12.913	57	37.81 45	2.070	49	35.24 55
29.1	24.462	14	19.41 53	23.857	155	33.03 227	12.889	24	37.20 61	2.050	20	35.78 54
July 9.1	24.478	16	19.93 52	23.751	106	30.47 256	12.899	10	36.45 75	2.057	7	36.31 53
		45	49		52	277		45	88		37	50
19.0	24.523		20.42	23.699		27.70	12.944		35.57	2.094		36.81
29.0	24.597	74	20.84 42	23.700	1	24.80 290	13.023	79	34.58 99	2.160	66	37.25 44
Aug. 8.0	24.698	101	21.17 33	23.759	59	21.87 293	13.136	113	33.47 111	2.254	94	37.60 35
18.0	24.828	130	21.39 22	23.875	116	19.00 287	13.280	144	32.25 122	2.375	121	37.81 21
27.9	24.986	158	21.45 6	24.049	174	16.31 269	13.457	177	30.96 129	2.523	148	37.89 8
		184	11		233	242		207	138		177	11
Sept. 6.9	25.170		21.34	24.282		13.89	13.664		29.58	2.700		37.78
16.9	25.380	210	21.01 33	24.567	285	11.84 205	13.900	236	28.12 146	2.903	203	37.45 33
26.9	25.615	235	20.46 55	24.902	335	10.26 158	14.166	266	26.60 152	3.131	228	36.90 55
Oct. 6.8	25.874	259	19.66 80	25.280	378	9.22 104	14.457	291	25.04 156	3.386	255	36.10 80
16.8	26.155	281	18.64 102	25.693	413	8.78 44	14.774	317	23.47 157	3.662	276	35.06 104
		298	126		440	19		837	154		296	127
26.8	26.453		17.38	26.133		8.97	15.111		21.93	3.958		33.79
Nov. 5.7	26.764	311	15.93 145	26.586	453	9.81 84	15.466	355	20.43 150	4.269	311	32.32 147
15.7	27.083	319	14.31 162	27.041	455	11.29 148	15.829	363	19.03 140	4.588	319	30.68 164
25.7	27.402	319	12.60 171	27.481	440	13.36 207	16.194	365	17.78 125	4.909	321	28.93 175
Dec. 5.7	27.711	309	10.83 177	27.896	415	15.96 260	16.550	356	16.72 106	5.223	314	27.12 181
		293	177		374	306		340	84		296	180
15.6	28.004		9.06	28.270		19.02	16.890		15.88	5.519		25.32
25.6	28.269	265	7.37 169	28.589	319	22.43 341	17.200	310	15.32 56	5.790	271	23.57 175
35.6	28.499	230	5.80 157	28.847	258	26.08 365	17.472	272	15.04 28	6.028	238	21.96 161
Mean Place	22.940		26.95	24.502		14.47	11.090		40.50	0.503		43.81
Sec δ, Tan δ	1.007		+0.118	1.718		-1.397	1.165		+0.598	1.006		+0.110
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.06		+0.01	+0.03		-0.06	+0.07		+0.03	+0.06		0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.3		+0.8	-0.3		+0.8	-0.3		+0.7	-0.3		+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Ursæ Majoris. Mag. 3.1		α Cancri. Mag. 4.3		β <sup>1</sup> Carinæ. Mag. 5.1		κ Ursæ Majoris. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 53 s	° ' " +48 21 "	h m 8 53 s	° ' " +12 10 "	h m 8 54 s	° ' " -58 54 "	h m 8 57 s	° ' " +47 28 "
Jan. 0.6	35.169	54.22	59.255	40.55	58.955	25.15	61.141	56.04
10.6	35.473 <sup>304</sup>	55.04 <sup>82</sup>	59.478 <sup>223</sup>	39.34 <sup>121</sup>	59.203 <sup>248</sup>	28.92 <sup>377</sup>	61.446 <sup>305</sup>	56.79 <sup>75</sup>
20.5	35.712 <sup>239</sup>	56.19 <sup>115</sup>	59.655 <sup>177</sup>	38.33 <sup>101</sup>	59.369 <sup>166</sup>	32.80 <sup>388</sup>	61.689 <sup>243</sup>	57.86 <sup>107</sup>
30.5	35.880 <sup>168</sup>	57.59 <sup>140</sup>	59.783 <sup>128</sup>	37.55 <sup>78</sup>	59.451 <sup>82</sup>	36.68 <sup>388</sup>	61.863 <sup>174</sup>	59.20 <sup>134</sup>
Feb. 9.5	35.973 <sup>93</sup>	59.19 <sup>160</sup>	59.858 <sup>75</sup>	36.98 <sup>57</sup>	59.448 <sup>3</sup>	40.46 <sup>378</sup>	61.963 <sup>100</sup>	60.75 <sup>155</sup>
19.5	35.994 <sup>21</sup>	60.91 <sup>172</sup>	59.881 <sup>23</sup>	36.64 <sup>34</sup>	59.365 <sup>83</sup>	44.06 <sup>360</sup>	61.991 <sup>28</sup>	62.44 <sup>169</sup>
Mar. 1.4	35.944 <sup>50</sup>	62.66 <sup>175</sup>	59.857 <sup>24</sup>	36.49 <sup>15</sup>	59.206 <sup>159</sup>	47.39 <sup>333</sup>	61.949 <sup>42</sup>	64.16 <sup>172</sup>
11.4	35.832 <sup>112</sup>	64.34 <sup>168</sup>	59.791 <sup>66</sup>	36.49 <sup>0</sup>	58.985 <sup>221</sup>	50.38 <sup>299</sup>	61.846 <sup>103</sup>	65.86 <sup>170</sup>
21.4	35.668 <sup>164</sup>	65.90 <sup>156</sup>	59.692 <sup>99</sup>	36.63 <sup>14</sup>	58.708 <sup>277</sup>	52.97 <sup>259</sup>	61.692 <sup>154</sup>	67.41 <sup>155</sup>
31.4	35.465 <sup>203</sup>	67.25 <sup>135</sup>	59.566 <sup>126</sup>	36.88 <sup>25</sup>	58.391 <sup>317</sup>	55.12 <sup>215</sup>	61.498 <sup>194</sup>	68.78 <sup>137</sup>
Apr. 10.3	35.236 <sup>229</sup>	68.33 <sup>108</sup>	59.426 <sup>140</sup>	37.18 <sup>30</sup>	58.044 <sup>347</sup>	56.80 <sup>168</sup>	61.277 <sup>221</sup>	69.90 <sup>112</sup>
20.3	34.994 <sup>242</sup>	69.11 <sup>78</sup>	59.279 <sup>147</sup>	37.53 <sup>35</sup>	57.678 <sup>366</sup>	57.98 <sup>118</sup>	61.043 <sup>234</sup>	70.72 <sup>82</sup>
30.3	34.752 <sup>242</sup>	69.56 <sup>45</sup>	59.133 <sup>146</sup>	37.90 <sup>37</sup>	57.308 <sup>370</sup>	58.65 <sup>67</sup>	60.807 <sup>236</sup>	71.22 <sup>50</sup>
May 10.2	34.521 <sup>231</sup>	69.66 <sup>10</sup>	58.996 <sup>137</sup>	38.28 <sup>38</sup>	56.942 <sup>300</sup>	58.80 <sup>15</sup>	60.582 <sup>225</sup>	71.38 <sup>16</sup>
20.2	34.313 <sup>208</sup>	69.42 <sup>24</sup>	58.875 <sup>121</sup>	38.66 <sup>38</sup>	56.591 <sup>351</sup>	58.42 <sup>38</sup>	60.378 <sup>204</sup>	71.20 <sup>18</sup>
30.2	34.134 <sup>179</sup>	68.84 <sup>58</sup>	58.774 <sup>101</sup>	39.03 <sup>37</sup>	56.266 <sup>325</sup>	57.55 <sup>87</sup>	60.202 <sup>176</sup>	70.70 <sup>50</sup>
June 9.2	33.990 <sup>144</sup>	67.96 <sup>88</sup>	58.699 <sup>75</sup>	39.37 <sup>34</sup>	55.974 <sup>292</sup>	56.20 <sup>135</sup>	60.060 <sup>142</sup>	69.88 <sup>82</sup>
19.1	33.888 <sup>102</sup>	66.79 <sup>117</sup>	58.649 <sup>50</sup>	39.68 <sup>31</sup>	55.722 <sup>252</sup>	54.41 <sup>179</sup>	59.957 <sup>103</sup>	68.77 <sup>111</sup>
29.1	33.830 <sup>58</sup>	65.37 <sup>142</sup>	58.628 <sup>21</sup>	39.96 <sup>28</sup>	55.517 <sup>205</sup>	52.24 <sup>217</sup>	59.897 <sup>60</sup>	67.42 <sup>135</sup>
July 9.1	33.816 <sup>14</sup>	63.73 <sup>164</sup>	58.634 <sup>6</sup>	40.18 <sup>22</sup>	55.365 <sup>152</sup>	49.74 <sup>250</sup>	59.881 <sup>16</sup>	65.83 <sup>159</sup>
19.1	33.849 <sup>33</sup>	61.91 <sup>182</sup>	58.671 <sup>37</sup>	40.35 <sup>17</sup>	55.270 <sup>95</sup>	47.00 <sup>274</sup>	59.909 <sup>28</sup>	64.07 <sup>176</sup>
29.0	33.927 <sup>78</sup>	59.95 <sup>196</sup>	58.737 <sup>66</sup>	40.44 <sup>9</sup>	55.238 <sup>32</sup>	44.09 <sup>291</sup>	59.981 <sup>72</sup>	62.16 <sup>191</sup>
Aug. 8.0	34.049 <sup>122</sup>	57.86 <sup>209</sup>	58.831 <sup>94</sup>	40.43 <sup>1</sup>	55.268 <sup>30</sup>	41.11 <sup>298</sup>	60.097 <sup>116</sup>	60.12 <sup>204</sup>
18.0	34.215 <sup>166</sup>	55.70 <sup>216</sup>	58.954 <sup>123</sup>	40.30 <sup>13</sup>	55.365 <sup>97</sup>	38.17 <sup>294</sup>	60.255 <sup>158</sup>	57.99 <sup>213</sup>
27.9	34.423 <sup>208</sup>	53.50 <sup>220</sup>	59.104 <sup>150</sup>	40.02 <sup>28</sup>	55.530 <sup>165</sup>	35.35 <sup>282</sup>	60.455 <sup>200</sup>	55.81 <sup>218</sup>
Sept. 6.9	34.672 <sup>249</sup>	51.29 <sup>221</sup>	59.282 <sup>178</sup>	39.59 <sup>43</sup>	55.761 <sup>231</sup>	32.77 <sup>258</sup>	60.696 <sup>241</sup>	53.61 <sup>220</sup>
16.9	34.960 <sup>288</sup>	49.10 <sup>219</sup>	59.487 <sup>205</sup>	38.97 <sup>62</sup>	56.056 <sup>295</sup>	30.54 <sup>223</sup>	60.974 <sup>278</sup>	51.42 <sup>219</sup>
26.9	35.283 <sup>323</sup>	46.98 <sup>212</sup>	59.719 <sup>232</sup>	38.16 <sup>81</sup>	56.410 <sup>354</sup>	28.75 <sup>179</sup>	61.290 <sup>316</sup>	49.29 <sup>213</sup>
Oct. 6.8	35.642 <sup>359</sup>	44.95 <sup>203</sup>	59.976 <sup>257</sup>	37.16 <sup>100</sup>	56.816 <sup>406</sup>	27.49 <sup>126</sup>	61.640 <sup>350</sup>	47.24 <sup>205</sup>
16.8	36.033 <sup>391</sup>	43.05 <sup>190</sup>	60.256 <sup>280</sup>	35.96 <sup>120</sup>	57.265 <sup>449</sup>	26.83 <sup>66</sup>	62.021 <sup>381</sup>	45.32 <sup>192</sup>
26.8	36.448 <sup>415</sup>	41.35 <sup>170</sup>	60.557 <sup>301</sup>	34.59 <sup>137</sup>	57.747 <sup>482</sup>	26.78 <sup>5</sup>	62.430 <sup>409</sup>	43.57 <sup>175</sup>
Nov. 5.8	36.884 <sup>436</sup>	39.87 <sup>148</sup>	60.872 <sup>315</sup>	33.08 <sup>151</sup>	58.247 <sup>500</sup>	27.39 <sup>61</sup>	62.859 <sup>429</sup>	42.05 <sup>152</sup>
15.7	37.333 <sup>449</sup>	38.68 <sup>119</sup>	61.197 <sup>325</sup>	31.46 <sup>162</sup>	58.752 <sup>505</sup>	28.67 <sup>128</sup>	63.301 <sup>442</sup>	40.79 <sup>126</sup>
25.7	37.781 <sup>448</sup>	37.80 <sup>88</sup>	61.525 <sup>328</sup>	29.80 <sup>166</sup>	59.243 <sup>491</sup>	30.57 <sup>190</sup>	63.745 <sup>444</sup>	39.83 <sup>96</sup>
Dec. 5.7	38.221 <sup>440</sup>	37.27 <sup>53</sup>	61.846 <sup>321</sup>	28.14 <sup>166</sup>	59.710 <sup>467</sup>	33.01 <sup>244</sup>	64.182 <sup>437</sup>	39.23 <sup>60</sup>
15.6	38.639 <sup>418</sup>	37.12 <sup>15</sup>	62.150 <sup>304</sup>	26.54 <sup>160</sup>	60.131 <sup>421</sup>	35.97 <sup>296</sup>	64.598 <sup>416</sup>	39.00 <sup>23</sup>
25.6	39.021 <sup>382</sup>	37.35 <sup>23</sup>	62.431 <sup>281</sup>	25.05 <sup>149</sup>	60.497 <sup>366</sup>	39.31 <sup>334</sup>	64.980 <sup>382</sup>	39.16 <sup>16</sup>
35.6	39.355 <sup>334</sup>	37.96 <sup>61</sup>	62.676 <sup>245</sup>	23.72 <sup>133</sup>	60.790 <sup>293</sup>	42.93 <sup>362</sup>	65.315 <sup>335</sup>	39.69 <sup>53</sup>
Mean Place	31.958	66.23	56.993	46.93	56.499	31.66	57.998	68.31
Sec δ, Tan δ	1.505	+1.125	1.023	+0.216	1.937	-1.658	1.480	+1.091
Dψ α, Dω α	+0.08	+0.05	+0.07	+0.01	+0.03	-0.08	+0.08	+0.05
Dψ δ, Dω δ	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Argus. Mag. 1.8		$\delta$ 33 Cancri. Mag. 6.6		$\gamma$ Argus. Mag. 2.2		$\epsilon$ 40 Lynceis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 12 s	° ' " -69 22 "	h m 9 14 s	° ' " +18 3 "	h m 9 14 s	° ' " -58 55 "	h m 9 16 s	° ' " +34 44 "
Jan. 0.6	20.56	22.50	23.394	19.83	54.335	28.40	2.790	27.64
10.6	20.91	26.19	23.641	18.84	54.621	32.08	3.070	27.56
20.6	21.14	30.07	23.843	18.12	54.829	35.93	3.299	27.82
30.5	21.26	34.03	23.995	17.64	54.952	39.82	3.472	28.36
Feb. 9.5	21.27	37.97	24.094	17.41	54.991	43.65	3.584	29.16
19.5	21.16	41.79	24.139	17.40	54.948	47.34	3.634	30.15
Mar. 1.4	20.93	45.39	24.134	17.59	54.831	50.79	3.627	31.28
11.4	20.62	48.72	24.086	17.92	54.646	53.94	3.567	32.49
21.4	20.23	51.68	23.999	18.35	54.403	56.73	3.463	33.67
31.4	19.77	54.24	23.883	18.85	54.114	59.10	3.326	34.79
Apr. 10.3	19.26	56.34	23.748	19.38	53.791	61.02	3.163	35.80
20.3	18.71	57.94	23.602	19.90	53.444	62.45	2.987	36.64
30.3	18.15	59.03	23.455	20.39	53.087	63.37	2.807	37.27
May 10.3	17.58	59.59	23.314	20.82	52.729	63.76	2.633	37.69
20.2	17.02	59.60	23.185	21.19	52.382	63.65	2.474	37.87
30.2	16.49	59.08	23.074	21.48	52.052	63.03	2.334	37.83
June 9.2	15.99	58.05	22.985	21.67	51.750	61.92	2.221	37.54
19.1	15.54	56.54	22.921	21.79	51.483	60.36	2.136	37.04
29.1	15.15	54.58	22.883	21.81	51.258	58.39	2.082	36.33
July 9.1	14.84	52.24	22.874	21.74	51.081	56.07	2.062	35.44
19.1	14.61	49.58	22.894	21.57	50.958	53.45	2.076	34.37
29.0	14.47	46.70	22.941	21.28	50.893	50.64	2.124	33.13
Aug. 8.0	14.43	43.66	23.018	20.88	50.892	47.71	2.206	31.77
18.0	14.48	40.59	23.124	20.36	50.956	44.77	2.322	30.27
28.0	14.63	37.60	23.257	19.68	51.088	41.91	2.472	28.65
Sept. 6.9	14.90	34.78	23.421	18.86	51.287	39.26	2.655	26.95
16.9	15.26	32.25	23.613	17.89	51.552	36.91	2.872	25.17
26.9	15.72	30.12	23.835	16.74	51.881	34.96	3.121	23.33
Oct. 6.8	16.26	28.47	24.085	15.45	52.265	33.50	3.401	21.46
16.8	16.86	27.39	24.360	14.01	52.700	32.62	3.712	19.60
26.8	17.52	26.94	24.660	12.46	53.172	32.35	4.048	17.78
Nov. 5.8	18.21	27.14	24.979	10.81	53.671	32.72	4.406	16.04
15.7	18.91	28.02	25.310	9.13	54.181	33.76	4.779	14.45
25.7	19.60	29.55	25.648	7.45	54.687	35.42	5.160	13.04
Dec. 5.7	20.26	31.69	25.983	5.85	55.171	37.67	5.538	11.87
15.7	20.85	34.37	26.306	4.35	55.619	40.44	5.902	10.96
25.6	21.37	37.52	26.606	3.02	56.015	43.64	6.241	10.38
35.6	21.79	41.04	26.875	1.91	56.349	47.16	6.544	10.12
Mean Place	17.664	30.83	21.132	28.33	51.990	35.56	0.205	39.40
Sec $\delta$ , Tan $\delta$	2.839	-2.657	1.052	+0.326	1.938	-1.660	1.217	+0.693
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.01	-0.13	+0.07	+0.02	+0.03	-0.08	+0.07	+0.03
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pyxidis. Mag. 4.9			$\alpha$ Hydræ. Mag. 2.2			$h$ Ursæ Majoris. Mag. 3.8			$d$ Ursæ Majoris. Mag. 4.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	9	17	-25 36	9	23	- 8 17	9	25	+63 24	9	27	+70 11
	s		"	s		"	s		"	s		"
Jan. 0.6	50.847		42.28	32.533		56.32	4.30		76.11	15.32		29.16
10.6	51.078	231	45.29 301	32.769	236	58.65 233	4.76	46	77.40 129	15.90	58	30.71 155
20.6	51.261	183	48.30 301	32.960	191	60.87 222	5.14	38	79.10 170	16.36	46	32.67 196
30.5	51.392	131	51.23 293	33.103	143	62.93 206	5.42	28	81.13 203	16.71	35	34.97 230
Feb. 9.5	51.471	79	53.99 276	33.196	93	64.79 186	5.59	17	83.40 227	16.92	21	37.52 255
		25	253		44	162		6	242		7	267
19.5	51.496		56.52	33.240		66.41	5.65		85.82	16.99		40.19
Mar. 1.5	51.472	24	58.80 228	33.238	2	67.79 138	5.62	3	88.28 246	16.93	6	42.87 268
11.4	51.405	67	60.77 197	33.193	45	68.89 110	5.49	13	90.66 238	16.74	19	45.44 257
21.4	51.303	102	62.43 166	33.113	80	69.75 86	5.28	21	92.86 220	16.45	29	47.82 238
31.4	51.171	132	63.73 130	33.006	107	70.35 60	5.00	28	94.81 195	16.06	39	49.88 206
		151	97		126	37		33	159		47	168
Apr. 10.3	51.020		64.70	32.880		70.72	4.67		96.40	15.59		51.56
20.3	50.857	163	65.30 60	32.743	137	70.85 13	4.30	37	97.60 120	15.09	50	52.79 123
30.3	50.691	166	65.54 24	32.603	140	70.77 8	3.91	39	98.35 75	14.56	53	53.53 74
May 10.3	50.529	162	65.44 10	32.467	136	70.47 30	3.53	38	98.63 28	14.03	53	53.76 23
20.2	50.376	153	65.01 43	32.341	126	70.00 47	3.16	37	98.45 18	13.52	51	53.49 27
		137	77		112	65		33	64		48	78
30.2	50.239		64.24	32.229		69.35	2.83		97.81	13.04		52.71
June 9.2	50.121	118	63.18 106	32.135	94	68.55 80	2.54	29	96.72 109	12.62	42	51.46 125
19.2	50.023	98	61.86 132	32.063	72	67.62 93	2.30	24	95.24 148	12.27	35	49.77 169
29.1	49.953	70	60.30 156	32.013	50	66.58 104	2.11	19	93.40 184	11.99	28	47.70 207
July 9.1	49.911	42	58.57 173	31.988	25	65.46 112	1.99	12	91.23 217	11.79	20	45.30 240
		15	187		0	115		6	243		11	270
19.1	49.896		56.70	31.988		64.31	1.93		88.80	11.68		42.60
29.0	49.913	17	54.76 194	32.016	28	63.17 114	1.94	1	86.15 265	11.67	1	39.70 290
Aug. 8.0	49.960	47	52.81 195	32.071	55	62.07 110	2.03	9	83.34 281	11.74	7	36.63 307
18.0	50.042	82	50.94 187	32.154	83	61.07 100	2.18	15	80.43 291	11.90	16	33.46 317
28.0	50.157	115	49.23 171	32.267	113	60.23 84	2.39	21	77.46 297	12.15	25	30.26 320
		148	151		141	62		27	296		34	318
Sept. 6.9	50.305		47.72	32.408		59.61	2.66		74.50	12.49		27.08
16.9	50.487	182	46.51 121	32.581	173	59.24 37	3.00	34	71.59 291	12.92	43	24.00 308
26.9	50.705	218	45.67 84	32.783	202	59.16 8	3.40	40	68.79 280	13.43	51	21.05 295
Oct. 6.9	50.953	248	45.26 41	33.014	231	59.42 26	3.86	46	66.17 262	14.01	58	18.30 275
16.8	51.231	278	45.30 4	33.273	259	60.04 62	4.37	51	63.76 241	14.66	65	15.84 246
		304	53		283	96		56	211		71	214
26.8	51.535		45.83	33.556		61.00	4.93		61.65	15.37		13.70
Nov. 5.8	51.858	323	46.85 102	33.860	304	62.32 132	5.52	59	59.88 177	16.12	75	11.96 174
15.7	52.194	336	48.34 149	34.176	316	63.96 164	6.14	62	58.49 139	16.90	78	10.65 131
25.7	52.533	339	50.27 193	34.499	323	65.87 191	6.77	63	57.55 94	17.70	80	9.82 83
Dec. 5.7	52.866	333	52.57 230	34.819	320	68.01 214	7.39	62	57.10 45	18.49	79	9.51 31
		317	262		307	227		60	3		76	23
15.7	53.183		55.19	35.126		70.28	7.99		57.13	19.25		9.74
25.6	53.473	290	58.02 283	35.413	287	72.64 236	8.55	56	57.67 54	19.96	71	10.50 76
35.6	53.727	254	60.99 297	35.668	255	74.99 235	9.05	50	58.68 101	20.59	63	11.76 126
Mean Place	48.883		43.41	30.551		53.44	0.187		92.34	10.177		46.05
Sec $\delta$ , Tan $\delta$	1.109		-0.480	1.011		-0.146	2.235		+1.999	2.951		+2.776
$D_{\mu} \alpha$ , $D_{\omega} \alpha$	+0.05		-0.02	+0.06		-0.01	+0.09		+0.10	+0.11		+0.15
$D_{\mu} \delta$ , $D_{\omega} \delta$	-0.3		+0.7	-0.3		+0.6	-0.3		+0.6	-0.3		+0.6

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Leonis. Mag. 3.8			♊ Antliae. Mag. 5.0			♋ Leonis. Mag. 3.1			♎ Argus. Mag. 3.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''
	9	36	+10 15	9	40	-27 23	9	41	+24 8	9	44	-64 41
	s		"	s		"	s		"	s		"
Jan. 0.6	45.437		66.53	31.957		18.68	10.823		73.85	64.05		3.85
10.6	45.693	256	65.04 149	32.210	253	21.71 303	11.101	278	73.07 78	64.43	38	7.38 353
20.6	45.907	214	63.79 125	32.418	208	24.76 305	11.335	234	72.57 50	64.72	29	11.15 377
30.5	46.073	166	62.77 102	32.575	157	27.77 301	11.521	186	72.39 18	64.93	21	15.06 391
Feb. 9.5	46.190	117	62.01 76	32.678	103	30.65 288	11.652	131	72.48 9	65.03	10	19.00 394
		66	53		51	267		76	34		1	387
19.5	46.256		61.48	32.729		33.32	11.728		72.82	65.04		22.87
Mar. 1.5	46.273	17	61.20 28	32.730	1	35.76 244	11.751	23	73.36 54	64.95	9	26.59 372
		27	9		45	214		26	71		16	30.06 347
11.4	46.246	65	61.11 8	32.685	84	37.90 184	11.725	67	74.07 79	64.79	24	33.23 317
21.4	46.181	94	61.19 22	32.601	115	41.24 150	11.658	101	74.86 84	64.55	31	36.04 281
31.4	46.087	117	32	32.486	137	115	11.557	126	83	64.24	35	238
Apr. 10.4	45.970		61.73	32.349		42.39	11.431		76.53	63.89		38.42
20.3	45.841	129	62.13 40	32.197	152	43.18 79	11.290	141	77.31 78	63.50	39	40.34 192
30.3	45.706	135	62.57 44	32.038	159	43.63 45	11.142	148	77.99 68	63.09	41	41.77 143
May 10.3	45.573	133	63.04 47	31.878	160	43.71 8	10.995	147	78.57 58	62.66	43	42.69 92
20.2	45.448	125	63.51 47	31.723	155	43.45 26	10.856	139	79.01 44	62.23	43	43.08 39
		110	46		144	60		124	28		42	15
30.2	45.338		63.97	31.579		42.85	10.732		79.29	61.81		42.93
June 9.2	45.244	94	64.40 43	31.451	128	41.94 91	10.625	107	79.43 14	61.41	40	42.27 66
19.2	45.172	72	64.81 41	31.342	109	40.74 120	10.540	85	79.42 1	61.05	36	41.10 117
29.1	45.121	51	65.16 35	31.254	88	39.29 145	10.481	59	79.24 18	60.72	33	39.47 163
July 9.1	45.095	26	65.46 30	31.192	62	37.62 167	10.448	33	78.91 33	60.44	28	37.43 204
		2	22		35	182		7	48		22	239
19.1	45.093		65.68	31.157		35.80	10.441		78.43	60.22		35.04
29.1	45.118	25	65.83 15	31.149	8	33.88 192	10.463	22	77.79 64	60.06	16	32.35 269
Aug. 8.0	45.169	51	65.86 3	31.173	24	31.92 196	10.513	50	77.01 78	59.98	8	29.48 287
		79	11		57	192		81	93		0	26.51 297
18.0	45.248	108	65.75 26	31.230	90	30.00 180	10.594	111	76.08 109	59.98	8	23.54 297
28.0	45.356	135	43	31.320	127	160	10.705	141	124	60.06	16	286
Sept. 6.9	45.491		65.06	31.447		26.60	10.846		73.75	60.22		20.68
16.9	45.657	166	64.42 64	31.610	163	25.26 134	11.019	173	72.37 138	60.47	25	18.05 263
26.9	45.852	195	63.58 84	31.810	200	24.27 99	11.224	205	70.84 153	60.80	33	15.76 229
Oct. 6.9	46.077	225	62.53 105	32.044	234	23.68 59	11.460	236	69.20 164	61.21	41	13.90 186
16.8	46.332	255	61.25 128	32.313	269	23.54 14	11.727	267	67.45 175	61.69	48	12.56 134
		279	146		298	36		296	181		54	75
26.8	46.611		59.79	32.611		23.90	12.023		65.64	62.23		11.81
Nov. 5.8	46.913	302	58.14 165	32.932	321	24.75 85	12.342	319	63.79 185	62.80	57	11.69 12
15.8	47.232	319	56.38 176	33.271	339	26.08 133	12.680	338	61.95 184	63.40	60	12.24 55
25.7	47.561	329	54.53 185	33.617	346	27.87 179	13.031	351	60.19 176	64.01	61	13.44 120
Dec. 5.7	47.891	330	52.66 187	33.962	345	30.07 220	13.382	351	58.55 164	64.60	59	15.27 183
		321	184		333	253		345	145		56	241
15.7	48.212		50.82	34.295		32.60	13.727		57.10	65.16		17.68
25.6	48.514	302	49.08 174	34.604	309	35.39 279	14.054	327	55.87 123	65.66	50	20.58 290
35.6	48.788	274	47.50 158	34.880	276	38.34 295	14.351	297	95	66.08	42	23.88 330
Mean Place	43.370		74.25	30.080		20.26	8.593		85.02	61.689		12.71
Sec δ, Tan δ	1.016		+0.181	1.126		-0.518	1.096		+0.448	2.339		-2.115
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.06		+0.01	+0.05		-0.03	+0.07		+0.02	+0.03		-0.12
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.3		+0.6	-0.3		+0.6	-0.3		+0.6	-0.3		+0.6



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Ursæ Majoris. Mag. 3.9		δ Sextantis. Mag. 6.0		μ Leonis. Mag. 4.1		Groombridge 1586. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 45 s	° ' +59 25 "	h m 9 47 s	° ' - 3 51 "	h m 9 48 s	° ' +26 23 "	h m 9 50 s	° ' +73 15 "
Jan. 0.6	9.550	30.01	5.048	18.04	4.987	42.48	65.06	70.64
10.6	9.989 <sup>439</sup>	30.93 <sup>92</sup>	5.302 <sup>254</sup>	20.20 <sup>216</sup>	5.274 <sup>287</sup>	41.77 <sup>71</sup>	65.77 <sup>71</sup>	72.05 <sup>141</sup>
20.6	10.357 <sup>368</sup>	32.29 <sup>136</sup>	5.516 <sup>214</sup>	22.24 <sup>204</sup>	5.517 <sup>243</sup>	41.37 <sup>40</sup>	66.36 <sup>59</sup>	73.93 <sup>188</sup>
30.6	10.643 <sup>286</sup>	34.02 <sup>173</sup>	5.685 <sup>169</sup>	24.10 <sup>186</sup>	5.711 <sup>194</sup>	41.29 <sup>8</sup>	66.82 <sup>46</sup>	76.20 <sup>227</sup>
Feb. 9.5	10.839 <sup>196</sup>	36.06 <sup>204</sup>	5.805 <sup>120</sup>	25.73 <sup>163</sup>	5.850 <sup>139</sup>	41.50 <sup>21</sup>	67.13 <sup>31</sup>	78.77 <sup>257</sup>
	102	223	70	141	85	46	14	275
19.5	10.941	38.29	5.875	27.14	5.935	41.96	67.27	81.52
Mar. 1.5	10.952 <sup>11</sup>	40.63 <sup>234</sup>	5.898 <sup>23</sup>	28.29 <sup>115</sup>	5.966 <sup>31</sup>	42.64 <sup>68</sup>	67.27 <sup>0</sup>	84.33 <sup>281</sup>
	75	234	20	92	19	82	16	276
11.4	10.877 <sup>154</sup>	42.97 <sup>222</sup>	5.878 <sup>57</sup>	29.21 <sup>66</sup>	5.947 <sup>64</sup>	43.46 <sup>92</sup>	67.11 <sup>30</sup>	87.09 <sup>258</sup>
21.4	10.723 <sup>217</sup>	45.19 <sup>202</sup>	5.821 <sup>86</sup>	29.87 <sup>44</sup>	5.883 <sup>98</sup>	44.38 <sup>96</sup>	66.81 <sup>41</sup>	89.67 <sup>231</sup>
31.4	10.506 <sup>268</sup>	47.21 <sup>174</sup>	5.735 <sup>108</sup>	30.31 <sup>22</sup>	5.785 <sup>125</sup>	45.34 <sup>94</sup>	66.40 <sup>51</sup>	91.98 <sup>195</sup>
Apr. 10.4	10.238	48.95 <sup>140</sup>	5.627 <sup>123</sup>	30.53 <sup>4</sup>	5.660 <sup>142</sup>	46.28 <sup>86</sup>	65.89 <sup>57</sup>	93.93 <sup>150</sup>
20.3	9.935 <sup>322</sup>	50.35 <sup>98</sup>	5.504 <sup>129</sup>	30.57 <sup>13</sup>	5.518 <sup>150</sup>	47.14 <sup>76</sup>	65.32 <sup>62</sup>	95.43 <sup>102</sup>
30.3	9.613 <sup>326</sup>	51.33 <sup>56</sup>	5.375 <sup>129</sup>	30.44 <sup>30</sup>	5.368 <sup>150</sup>	47.90 <sup>63</sup>	64.70 <sup>64</sup>	96.45 <sup>51</sup>
May 10.3	9.287 <sup>317</sup>	51.89 <sup>11</sup>	5.246 <sup>123</sup>	30.14 <sup>44</sup>	5.218 <sup>144</sup>	48.53 <sup>47</sup>	64.06 <sup>63</sup>	96.96 <sup>4</sup>
20.2	8.970 <sup>295</sup>	52.00 <sup>34</sup>	5.123 <sup>111</sup>	29.70 <sup>56</sup>	5.074 <sup>131</sup>	49.00 <sup>28</sup>	63.43 <sup>60</sup>	96.92 <sup>57</sup>
30.2	8.675 <sup>264</sup>	51.66 <sup>76</sup>	5.012 <sup>98</sup>	29.14 <sup>68</sup>	4.943 <sup>112</sup>	49.28 <sup>12</sup>	62.83 <sup>55</sup>	96.35 <sup>107</sup>
June 9.2	8.411 <sup>226</sup>	50.90 <sup>118</sup>	4.914 <sup>79</sup>	28.46 <sup>77</sup>	4.831 <sup>92</sup>	49.40 <sup>6</sup>	62.28 <sup>49</sup>	95.28 <sup>154</sup>
19.2	8.185 <sup>180</sup>	49.72 <sup>156</sup>	4.835 <sup>60</sup>	27.69 <sup>84</sup>	4.739 <sup>67</sup>	49.34 <sup>25</sup>	61.79 <sup>41</sup>	93.74 <sup>198</sup>
29.1	8.005 <sup>129</sup>	48.16 <sup>189</sup>	4.775 <sup>38</sup>	26.85 <sup>87</sup>	4.672 <sup>42</sup>	49.09 <sup>41</sup>	61.38 <sup>32</sup>	91.76 <sup>234</sup>
July 9.1	7.876 <sup>77</sup>	46.27 <sup>218</sup>	4.737 <sup>14</sup>	25.98 <sup>89</sup>	4.630 <sup>14</sup>	48.68 <sup>59</sup>	61.06 <sup>22</sup>	89.42 <sup>269</sup>
19.1	7.799 <sup>21</sup>	44.09 <sup>244</sup>	4.723 <sup>10</sup>	25.09 <sup>87</sup>	4.616 <sup>15</sup>	48.09 <sup>76</sup>	60.84 <sup>12</sup>	86.73 <sup>296</sup>
29.1	7.778 <sup>36</sup>	41.65 <sup>263</sup>	4.733 <sup>36</sup>	24.22 <sup>81</sup>	4.631 <sup>43</sup>	47.33 <sup>92</sup>	60.72 <sup>1</sup>	83.77 <sup>315</sup>
Aug. 8.0	7.814 <sup>94</sup>	39.02 <sup>278</sup>	4.769 <sup>63</sup>	23.41 <sup>69</sup>	4.674 <sup>74</sup>	46.41 <sup>107</sup>	60.71 <sup>9</sup>	80.62 <sup>329</sup>
18.0	7.908 <sup>152</sup>	36.24 <sup>289</sup>	4.832 <sup>90</sup>	22.72 <sup>56</sup>	4.748 <sup>104</sup>	45.34 <sup>124</sup>	60.80 <sup>20</sup>	77.33 <sup>338</sup>
28.0	8.060 <sup>209</sup>	33.35 <sup>293</sup>	4.922 <sup>121</sup>	22.16 <sup>37</sup>	4.852 <sup>135</sup>	44.10 <sup>138</sup>	61.00 <sup>31</sup>	73.95 <sup>338</sup>
Sept. 6.9	8.269	30.42	5.043	21.79	4.987	42.72	61.31	70.57
16.9	8.535 <sup>266</sup>	27.49 <sup>293</sup>	5.195 <sup>152</sup>	21.67 <sup>12</sup>	5.156 <sup>169</sup>	41.20 <sup>152</sup>	61.71 <sup>40</sup>	67.24 <sup>333</sup>
26.9	8.857 <sup>322</sup>	24.61 <sup>288</sup>	5.377 <sup>182</sup>	21.82 <sup>15</sup>	5.357 <sup>201</sup>	39.54 <sup>166</sup>	62.22 <sup>51</sup>	64.03 <sup>321</sup>
Oct. 6.9	9.233 <sup>376</sup>	21.85 <sup>276</sup>	5.591 <sup>214</sup>	22.25 <sup>43</sup>	5.590 <sup>233</sup>	37.77 <sup>177</sup>	62.82 <sup>60</sup>	61.01 <sup>302</sup>
16.8	9.659 <sup>426</sup>	19.27 <sup>258</sup>	5.835 <sup>244</sup>	23.01 <sup>76</sup>	5.855 <sup>265</sup>	35.92 <sup>185</sup>	63.52 <sup>70</sup>	58.24 <sup>277</sup>
	471	236	271	106	295	191	77	244
26.8	10.130	16.91	6.106	24.09	6.150	34.01	64.29	55.80
Nov. 5.8	10.640 <sup>510</sup>	14.86 <sup>205</sup>	6.402 <sup>296</sup>	25.47 <sup>138</sup>	6.470 <sup>320</sup>	32.09 <sup>192</sup>	65.12 <sup>83</sup>	53.75 <sup>205</sup>
15.8	11.180 <sup>540</sup>	13.15 <sup>171</sup>	6.715 <sup>313</sup>	27.14 <sup>167</sup>	6.811 <sup>341</sup>	30.21 <sup>188</sup>	66.00 <sup>88</sup>	52.14 <sup>161</sup>
25.7	11.736 <sup>556</sup>	11.84 <sup>131</sup>	7.038 <sup>323</sup>	29.03 <sup>189</sup>	7.165 <sup>354</sup>	28.42 <sup>179</sup>	66.91 <sup>91</sup>	51.02 <sup>112</sup>
Dec. 5.7	12.296 <sup>560</sup>	11.00 <sup>84</sup>	7.364 <sup>326</sup>	31.11 <sup>208</sup>	7.522 <sup>357</sup>	26.78 <sup>164</sup>	67.82 <sup>91</sup>	50.44 <sup>58</sup>
	546	35	318	218	351	144	89	0
15.7	12.842	10.65	7.682	33.29	7.873	25.34	68.71	50.44
25.6	13.361 <sup>519</sup>	10.78 <sup>13</sup>	7.982 <sup>300</sup>	35.51 <sup>222</sup>	8.207 <sup>334</sup>	24.16 <sup>118</sup>	69.56 <sup>85</sup>	50.99 <sup>55</sup>
35.6	13.831 <sup>470</sup>	11.41 <sup>63</sup>	8.255 <sup>273</sup>	37.72 <sup>221</sup>	8.513 <sup>306</sup>	23.26 <sup>90</sup>	70.31 <sup>75</sup>	52.09 <sup>110</sup>
Mean Place	6.034	47.52	3.136	13.59	2.755	54.51	59.596	89.75
Sec δ, Tan δ	1.966	+1.693	1.002	-0.067	1.116	+0.496	3.474	+3.327
Dψ α, Dω α	+0.09	+0.09	+0.06	0.00	+0.07	+0.03	+0.11	+0.19
Dψ δ, Dω δ	-0.3	+0.6	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	19 Leonis Minoris. Mag. 5.2			φ Argus. Mag. 3.7			π Leonis. Mag. 4.9			γ Leonis. Mag. 3.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	9	52	+41 26	9	53	-54 10	9	55	+ 8 26	10	2	+17 9
	s		"	s		"	s		"	s		"
Jan. 0.6	38.951		50.28	58.764		13.67	51.682		26.75	50.516		54.05
10.6	39.284	333	50.27 1	59.093	329	17.12 345	51.951	269	25.12 163	50.799	283	52.81 124
20.6	39.567	283	50.67 40	59.357	264	20.78 366	52.180	229	23.70 142	51.042	243	51.83 98
30.6	39.794	227	51.44 77	59.551	194	24.55 377	52.363	183	22.53 117	51.239	197	51.15 68
Feb. 9.5	39.958	164	52.54 110	59.672	121	28.33 378	52.498	135	21.61 92	51.386	147	50.74 41
		97	133		46	369		82	65		96	12
19.5	40.055		53.87	59.718		32.02	52.580		20.96	51.482		50.62
Mar. 1.5	40.090	35	55.38 151	59.697	21	35.53 351	52.618	38	20.53 43	51.526	44	50.73 11
11.4	40.065	25	56.99 161	59.611	86	38.80 327	52.609	9	20.34 19	51.524	2	51.06 33
21.4	39.986	79	58.62 163	59.467	144	41.76 296	52.562	47	20.34 0	51.481	43	51.54 48
31.4	39.864	122	60.18 156	59.278	189	44.36 260	52.483	79	20.49 15	51.404	77	52.12 58
		156	143		226	220		103	29		104	65
Apr. 10.4	39.708		61.61	59.052		46.56	52.380		20.78	51.300		52.77
20.3	39.529	179	62.83 122	58.796	256	48.30 174	52.261	119	21.15 37	51.179	121	53.44 67
30.3	39.338	191	63.82 99	58.522	274	49.57 127	52.135	126	21.59 44	51.049	130	54.10 66
May 10.3	39.145	193	64.52 70	58.240	282	50.36 79	52.007	128	22.07 48	50.916	133	54.71 61
20.3	38.957	188	64.93 41	57.957	283	50.66 30	51.885	122	22.57 50	50.788	128	55.26 55
		175	10		276	21		112	50		118	47
30.2	38.782		65.03	57.681		50.45	51.773		23.07	50.670		55.73
June 9.2	38.630	152	64.80 23	57.420	261	49.77 68	51.675	98	23.56 49	50.565	105	56.09 36
19.2	38.503	127	64.29 51	57.180	240	48.62 115	51.594	81	24.03 47	50.476	89	56.34 25
29.1	38.403	100	63.47 82	56.969	211	47.06 156	51.533	61	24.46 43	50.409	67	56.48 14
July 9.1	38.336	67	62.39 108	56.790	179	45.09 197	51.493	40	24.84 38	50.362	47	56.50 2
		34	131		138	226		17	31		22	10
19.1	38.302		61.08	56.652		42.83	51.476		25.15	50.340		56.40
29.1	38.301	1	59.51 157	56.559	93	40.28 255	51.483	7	25.37 22	50.342	2	56.15 25
Aug. 8.0	38.338	37	57.76 175	56.514	45	37.59 269	51.517	34	25.48 11	50.370	28	55.76 39
18.0	38.412	74	55.85 191	56.524	10	34.81 278	51.576	59	25.46 2	50.424	54	55.22 54
28.0	38.523	111	53.77 208	56.591	67	32.05 276	51.663	87	25.27 19	50.508	84	54.50 72
		148	218		126	263		116	36		114	88
Sept. 7.0	38.671		51.59	56.717		29.42	51.779		24.91	50.622		53.62
16.9	38.858	187	49.32 227	56.906	189	27.01 241	51.925	146	24.35 56	50.766	144	52.55 107
26.9	39.084	226	46.99 233	57.154	248	24.93 208	52.102	177	23.55 80	50.943	177	51.29 126
Oct. 6.9	39.349	265	44.65 234	57.460	306	23.29 164	52.312	210	22.53 102	51.151	208	49.86 143
16.8	39.650	301	42.34 231	57.819	359	22.14 115	52.551	239	21.29 124	51.392	241	48.25 161
		335	223		403	58		270	146		273	174
26.8	39.985		40.11	58.222		21.56	52.821		19.83	51.665		46.51
Nov. 5.8	40.351	366	38.01 210	58.661	439	21.60 4	53.115	294	18.17 166	51.964	299	44.66 165
15.8	40.742	391	36.10 191	59.123	462	22.26 66	53.429	314	16.37 180	52.284	320	42.75 191
25.7	41.147	405	34.44 166	59.596	473	23.56 130	53.756	327	14.46 191	52.619	335	40.82 193
Dec. 5.7	41.557	410	33.06 138	60.063	467	25.45 189	54.087	331	12.50 196	52.960	341	38.94 188
		404	102		447	243		327	195		338	178
15.7	41.961		32.04	60.510		27.88	54.414		10.55	53.298		37.16
25.7	42.346	385	31.41 63	60.921	411	30.77 289	54.724	310	8.69 186	53.623	325	35.56 160
35.6	42.701	355	31.18 23	61.284	363	34.02 325	55.010	286	6.95 174	53.922	299	34.17 139
Mean Place	36.398		65.64	56.760		21.11	49.720		34.70	48.496		64.54
Sec δ, Tan δ	1.334		+0.883	1.708		-1.385	1.011		+0.148	1.047		+0.309
Dψ a, Dω a	+0.07		+0.05	+0.04		-0.08	+0.06		+0.01	+0.06		+0.02
Dψ δ, Dω δ	-0.3		+0.5	-0.3		+0.5	-0.3		+0.5	-0.3		+0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Leonis. (Regulus.) Mag. 1.3		$\lambda$ Hydræ. Mag. 3.8		$\eta$ Velorum. Mag. 4.1		32 Ursæ Majoris. Mag. 5.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 3 s	° ' " +12 21 "	h m 10 6 s	° ' " -11 56 "	h m 10 11 s	° ' " -41 42 "	h m 10 12 s	° ' " +65 30 "
Jan. 0.6	59.183	74.71	34.292	38.47	16.664	32.10	5.19	62.69
10.6	59.461 <sup>278</sup>	73.23 <sup>148</sup>	34.559 <sup>267</sup>	40.96 <sup>249</sup>	16.971 <sup>307</sup>	35.32 <sup>322</sup>	5.75 <sup>56</sup>	63.57 <sup>88</sup>
20.6	59.699 <sup>238</sup>	72.00 <sup>123</sup>	34.788 <sup>229</sup>	43.39 <sup>243</sup>	17.228 <sup>257</sup>	38.70 <sup>338</sup>	6.23 <sup>48</sup>	64.96 <sup>139</sup>
30.6	59.892 <sup>193</sup>	71.03 <sup>97</sup>	34.973 <sup>185</sup>	45.70 <sup>231</sup>	17.429 <sup>201</sup>	42.16 <sup>346</sup>	6.61 <sup>38</sup>	66.78 <sup>182</sup>
Feb. 9.5	60.037 <sup>145</sup>	70.34 <sup>69</sup>	35.109 <sup>136</sup>	47.82 <sup>212</sup>	17.571 <sup>142</sup>	45.59 <sup>343</sup>	6.90 <sup>29</sup>	68.96 <sup>218</sup>
	93	43	87	191	84	333	16	243
19.5	60.130	69.91	35.196	49.73	17.655	48.92	7.06	71.39
Mar. 1.5	60.174 <sup>44</sup>	69.73 <sup>18</sup>	35.235 <sup>39</sup>	51.39 <sup>166</sup>	17.681 <sup>26</sup>	52.06 <sup>314</sup>	7.12 <sup>6</sup>	73.99 <sup>260</sup>
11.5	60.174 <sup>0</sup>	69.77 <sup>4</sup>	35.232 <sup>3</sup>	52.80 <sup>141</sup>	17.654 <sup>27</sup>	54.97 <sup>291</sup>	7.08 <sup>4</sup>	76.61 <sup>262</sup>
21.4	60.133 <sup>41</sup>	69.99 <sup>22</sup>	35.189 <sup>43</sup>	53.93 <sup>113</sup>	17.580 <sup>74</sup>	57.57 <sup>260</sup>	6.94 <sup>14</sup>	79.14 <sup>253</sup>
31.4	60.058 <sup>75</sup>	70.35 <sup>36</sup>	35.115 <sup>74</sup>	54.81 <sup>88</sup>	17.466 <sup>114</sup>	59.85 <sup>228</sup>	6.71 <sup>23</sup>	81.50 <sup>236</sup>
	99	45	98	61	144	190	30	207
Apr. 10.4	59.959	70.80	35.017	55.42	17.322	61.75	6.41	83.57
20.3	59.842 <sup>117</sup>	71.32 <sup>52</sup>	34.901 <sup>116</sup>	55.79 <sup>37</sup>	17.153 <sup>169</sup>	63.25 <sup>150</sup>	6.04 <sup>37</sup>	85.29 <sup>172</sup>
30.3	59.717 <sup>125</sup>	71.87 <sup>55</sup>	34.777 <sup>124</sup>	55.91 <sup>12</sup>	16.969 <sup>184</sup>	64.34 <sup>109</sup>	5.65 <sup>39</sup>	86.59 <sup>130</sup>
May 10.3	59.589 <sup>128</sup>	72.43 <sup>56</sup>	34.649 <sup>128</sup>	55.81 <sup>10</sup>	16.776 <sup>193</sup>	65.00 <sup>66</sup>	5.24 <sup>41</sup>	87.43 <sup>84</sup>
20.3	59.464 <sup>125</sup>	72.96 <sup>53</sup>	34.523 <sup>126</sup>	55.49 <sup>32</sup>	16.582 <sup>194</sup>	65.23 <sup>28</sup>	4.83 <sup>41</sup>	87.79 <sup>36</sup>
	114	50	117	51	190	20	40	13
30.2	59.350	73.46	34.406	54.98	16.392	65.03	4.43	87.66
June 9.2	59.247 <sup>103</sup>	73.90 <sup>44</sup>	34.298 <sup>108</sup>	54.28 <sup>70</sup>	16.211 <sup>181</sup>	64.42 <sup>61</sup>	4.06 <sup>37</sup>	87.03 <sup>63</sup>
19.2	59.161 <sup>86</sup>	74.28 <sup>38</sup>	34.205 <sup>93</sup>	53.43 <sup>85</sup>	16.045 <sup>166</sup>	63.40 <sup>102</sup>	3.72 <sup>34</sup>	85.94 <sup>109</sup>
29.2	59.095 <sup>66</sup>	74.59 <sup>31</sup>	34.130 <sup>75</sup>	52.44 <sup>99</sup>	15.897 <sup>148</sup>	62.02 <sup>138</sup>	3.44 <sup>28</sup>	84.42 <sup>152</sup>
July 9.1	59.049 <sup>46</sup>	74.81 <sup>22</sup>	34.073 <sup>57</sup>	51.34 <sup>110</sup>	15.774 <sup>123</sup>	60.31 <sup>171</sup>	3.22 <sup>22</sup>	82.50 <sup>192</sup>
	23	12	36	117	97	198	18	228
19.1	59.026	74.93	34.037	50.17	15.677	58.33	3.04	80.22
29.1	59.026 <sup>0</sup>	74.94 <sup>1</sup>	34.026 <sup>11</sup>	48.97 <sup>120</sup>	15.613 <sup>64</sup>	56.13 <sup>220</sup>	2.93 <sup>11</sup>	77.63 <sup>259</sup>
Aug. 8.0	59.052 <sup>26</sup>	74.83 <sup>11</sup>	34.039 <sup>13</sup>	47.80 <sup>117</sup>	15.583 <sup>30</sup>	53.79 <sup>234</sup>	2.89 <sup>4</sup>	74.81 <sup>282</sup>
18.0	59.103 <sup>51</sup>	74.56 <sup>27</sup>	34.079 <sup>40</sup>	46.69 <sup>111</sup>	15.592 <sup>9</sup>	51.40 <sup>239</sup>	2.92 <sup>3</sup>	71.78 <sup>303</sup>
28.0	59.184 <sup>81</sup>	74.13 <sup>43</sup>	34.148 <sup>69</sup>	45.70 <sup>99</sup>	15.643 <sup>51</sup>	49.03 <sup>237</sup>	3.04 <sup>12</sup>	68.62 <sup>316</sup>
	110	60	100	80	96	225	17	324
Sept. 7.0	59.294	73.53	34.248	44.90	15.739	46.78	3.21	65.38
16.9	59.433 <sup>139</sup>	72.72 <sup>81</sup>	34.381 <sup>133</sup>	44.32 <sup>58</sup>	15.881 <sup>142</sup>	44.76 <sup>202</sup>	3.46 <sup>25</sup>	62.12 <sup>326</sup>
26.9	59.605 <sup>172</sup>	71.72 <sup>100</sup>	34.547 <sup>166</sup>	44.04 <sup>28</sup>	16.071 <sup>190</sup>	43.04 <sup>172</sup>	3.78 <sup>32</sup>	58.90 <sup>322</sup>
Oct. 6.9	59.810 <sup>205</sup>	70.50 <sup>122</sup>	34.748 <sup>201</sup>	44.07 <sup>3</sup>	16.308 <sup>237</sup>	41.71 <sup>133</sup>	4.17 <sup>39</sup>	55.81 <sup>309</sup>
16.9	60.045 <sup>235</sup>	69.08 <sup>142</sup>	34.980 <sup>232</sup>	44.47 <sup>40</sup>	16.588 <sup>280</sup>	40.85 <sup>86</sup>	4.63 <sup>46</sup>	52.88 <sup>293</sup>
	267	161	265	78	321	35	51	268
26.8	60.312	67.47	35.245	45.25	16.909	40.50	5.14	50.20
Nov. 5.8	60.605 <sup>293</sup>	65.72 <sup>175</sup>	35.536 <sup>291</sup>	46.39 <sup>114</sup>	17.264 <sup>355</sup>	40.71 <sup>21</sup>	5.72 <sup>58</sup>	47.82 <sup>238</sup>
15.8	60.920 <sup>315</sup>	63.85 <sup>187</sup>	35.849 <sup>313</sup>	47.89 <sup>150</sup>	17.644 <sup>380</sup>	41.50 <sup>79</sup>	6.34 <sup>62</sup>	45.83 <sup>199</sup>
25.7	61.249 <sup>329</sup>	61.91 <sup>194</sup>	36.175 <sup>326</sup>	49.71 <sup>182</sup>	18.038 <sup>394</sup>	42.84 <sup>134</sup>	6.99 <sup>65</sup>	44.29 <sup>154</sup>
Dec. 5.7	61.584 <sup>335</sup>	59.97 <sup>194</sup>	36.506 <sup>331</sup>	51.80 <sup>209</sup>	18.435 <sup>397</sup>	44.71 <sup>187</sup>	7.65 <sup>66</sup>	43.23 <sup>106</sup>
	332	189	326	229	387	235	65	53
15.7	61.916	58.08	36.832	54.09	18.822	47.06	8.30	42.70
25.7	62.234 <sup>318</sup>	56.31 <sup>177</sup>	37.143 <sup>311</sup>	56.51 <sup>242</sup>	19.186 <sup>364</sup>	49.81 <sup>275</sup>	8.93 <sup>63</sup>	42.73 <sup>3</sup>
35.6	62.527 <sup>293</sup>	54.72 <sup>159</sup>	37.429 <sup>286</sup>	58.99 <sup>248</sup>	19.517 <sup>331</sup>	52.88 <sup>307</sup>	9.52 <sup>59</sup>	43.30 <sup>57</sup>
Mean Place	57.221	83.99	32.504	35.89	14.886	37.28	1.438	82.84
Sec $\delta$ , Tan $\delta$	1.024	+0.219	1.022	-0.212	1.340	-0.891	2.413	+2.196
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	+0.01	+0.06	-0.01	+0.05	-0.05	+0.09	+0.13
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.3	+0.5	-0.3	+0.5	-0.4	+0.5	-0.4	+0.5



APPARENT PLACES OF STARS, 1917. 401  
FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	36 Ursæ Majoris. Mag. 4.8			9 H. Draconis. Mag. 5.0			ρ Leonis. Mag. 3.8			33 Sextantis. Mag. 6.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''
	10	25	+56 23	10	28	+76 7	10	28	+ 9 43	10	37	- 1 18
	s		"	s		"	s		"	s		"
Jan. 0.7	22.448		63.78	10.19		65.99	28.369		53.58	12.528		23.06
10.6	22.900 <sup>452</sup>		64.16 <sup>38</sup>	11.11 <sup>92</sup>		67.07 <sup>108</sup>	28.659 <sup>290</sup>		51.91 <sup>167</sup>	12.817 <sup>289</sup>		25.17 <sup>211</sup>
20.6	23.295 <sup>395</sup>		65.03 <sup>87</sup>	11.90 <sup>79</sup>		68.68 <sup>161</sup>	28.914 <sup>255</sup>		50.46 <sup>145</sup>	13.072 <sup>255</sup>		27.15 <sup>198</sup>
30.6	23.621 <sup>326</sup>		66.36 <sup>133</sup>	12.55 <sup>65</sup>		70.77 <sup>209</sup>	29.128 <sup>214</sup>		49.27 <sup>119</sup>	13.287 <sup>215</sup>		28.95 <sup>180</sup>
Feb. 9.6	23.871 <sup>250</sup>		68.08 <sup>172</sup>	13.04 <sup>49</sup>		73.23 <sup>246</sup>	29.295 <sup>167</sup>		48.35 <sup>92</sup>	13.456 <sup>169</sup>		30.51 <sup>156</sup>
		167			31			118			122	
			203			275			63			133
19.5	24.038		70.11	13.35		75.98	29.413		47.72	13.578		31.84
Mar. 1.5	24.120 <sup>82</sup>		72.34 <sup>223</sup>	13.46 <sup>11</sup>		78.88 <sup>290</sup>	29.483 <sup>70</sup>		47.35 <sup>37</sup>	13.653 <sup>75</sup>		32.90 <sup>106</sup>
11.5	24.120 <sup>0</sup>		74.67 <sup>233</sup>	13.40 <sup>6</sup>		81.81 <sup>293</sup>	29.506 <sup>23</sup>		47.23 <sup>12</sup>	13.684 <sup>31</sup>		33.70 <sup>80</sup>
21.4	24.045 <sup>75</sup>		77.00 <sup>233</sup>	13.15 <sup>25</sup>		84.64 <sup>283</sup>	29.489 <sup>17</sup>		47.31 <sup>8</sup>	13.674 <sup>10</sup>		34.27 <sup>57</sup>
31.4	23.904 <sup>141</sup>		79.23 <sup>223</sup>	12.76 <sup>39</sup>		87.26 <sup>262</sup>	29.438 <sup>51</sup>		47.57 <sup>26</sup>	13.632 <sup>42</sup>		34.62 <sup>35</sup>
		195			52			79			70	
			203			233			38			14
Apr. 10.4	23.709		81.26	12.24		89.59	29.359		47.95	13.562		34.76
20.4	23.472 <sup>237</sup>		83.01 <sup>175</sup>	11.61 <sup>63</sup>		91.51 <sup>192</sup>	29.260 <sup>99</sup>		48.43 <sup>48</sup>	13.472 <sup>90</sup>		34.73 <sup>3</sup>
30.3	23.206 <sup>266</sup>		84.44 <sup>143</sup>	10.89 <sup>72</sup>		92.97 <sup>146</sup>	29.148 <sup>112</sup>		48.97 <sup>54</sup>	13.368 <sup>104</sup>		34.54 <sup>19</sup>
May 10.3	22.925 <sup>281</sup>		85.47 <sup>103</sup>	10.14 <sup>75</sup>		93.91 <sup>94</sup>	29.029 <sup>119</sup>		49.54 <sup>57</sup>	13.257 <sup>111</sup>		34.22 <sup>32</sup>
20.3	22.641 <sup>284</sup>		86.08 <sup>61</sup>	9.37 <sup>77</sup>		94.32 <sup>41</sup>	28.912 <sup>117</sup>		50.12 <sup>58</sup>	13.144 <sup>113</sup>		33.80 <sup>42</sup>
		277			77			114			110	
			18			13			56			51
30.3	22.364		86.26	8.60		94.19	28.798		50.68	13.034		33.29
June 9.2	22.105 <sup>259</sup>		86.00 <sup>26</sup>	7.86 <sup>74</sup>		93.51 <sup>68</sup>	28.693 <sup>105</sup>		51.20 <sup>52</sup>	12.930 <sup>104</sup>		32.70 <sup>59</sup>
19.2	21.869 <sup>236</sup>		85.30 <sup>70</sup>	7.17 <sup>69</sup>		92.31 <sup>120</sup>	28.600 <sup>93</sup>		51.68 <sup>48</sup>	12.836 <sup>94</sup>		32.05 <sup>65</sup>
29.2	21.666 <sup>203</sup>		84.20 <sup>110</sup>	6.56 <sup>61</sup>		90.62 <sup>169</sup>	28.524 <sup>76</sup>		52.10 <sup>42</sup>	12.755 <sup>81</sup>		31.37 <sup>68</sup>
July 9.1	21.500 <sup>166</sup>		82.72 <sup>148</sup>	6.04 <sup>52</sup>		88.49 <sup>213</sup>	28.464 <sup>60</sup>		52.45 <sup>35</sup>	12.690 <sup>65</sup>		30.68 <sup>69</sup>
		125			42			41			49	
			183			252			23			69
19.1	21.375		80.89	5.62		85.97	28.423		52.68	12.641		29.99
29.1	21.294 <sup>81</sup>		78.74 <sup>215</sup>	5.31 <sup>31</sup>		83.11 <sup>286</sup>	28.404 <sup>19</sup>		52.82 <sup>14</sup>	12.612 <sup>29</sup>		29.34 <sup>65</sup>
Aug. 8.1	21.260 <sup>34</sup>		76.33 <sup>241</sup>	5.11 <sup>20</sup>		79.97 <sup>314</sup>	28.407 <sup>3</sup>		52.84 <sup>2</sup>	12.604 <sup>8</sup>		28.75 <sup>59</sup>
18.0	21.276 <sup>16</sup>		73.69 <sup>264</sup>	5.04 <sup>7</sup>		76.63 <sup>334</sup>	28.435 <sup>28</sup>		52.71 <sup>13</sup>	12.621 <sup>17</sup>		28.27 <sup>48</sup>
28.0	21.343 <sup>67</sup>		70.88 <sup>281</sup>	5.10 <sup>6</sup>		73.13 <sup>350</sup>	28.489 <sup>54</sup>		52.41 <sup>30</sup>	12.663 <sup>42</sup>		27.92 <sup>35</sup>
		120			20			85			73	
			295			357			48			16
Sept. 7.0	21.463		67.93	5.30		69.56	28.574		51.93	12.736		27.76
17.0	21.637 <sup>174</sup>		64.90 <sup>303</sup>	5.61 <sup>31</sup>		65.98 <sup>358</sup>	28.689 <sup>115</sup>		51.23 <sup>70</sup>	12.840 <sup>104</sup>		27.80 <sup>4</sup>
26.9	21.866 <sup>229</sup>		61.86 <sup>304</sup>	6.05 <sup>44</sup>		62.48 <sup>350</sup>	28.837 <sup>148</sup>		50.33 <sup>90</sup>	12.976 <sup>136</sup>		28.10 <sup>30</sup>
Oct. 6.9	22.151 <sup>285</sup>		58.85 <sup>301</sup>	6.62 <sup>57</sup>		59.11 <sup>337</sup>	29.018 <sup>181</sup>		49.19 <sup>114</sup>	13.148 <sup>172</sup>		28.67 <sup>57</sup>
16.9	22.488 <sup>337</sup>		55.94 <sup>291</sup>	7.31 <sup>69</sup>		55.94 <sup>317</sup>	29.235 <sup>217</sup>		47.85 <sup>134</sup>	13.356 <sup>208</sup>		29.51 <sup>84</sup>
		388			80			249			240	
			275			288			157			114
26.8	22.876		53.19	8.11		53.06	29.484		46.28	13.596		30.65
Nov. 5.8	23.310 <sup>434</sup>		50.68 <sup>251</sup>	9.00 <sup>89</sup>		50.55 <sup>251</sup>	29.762 <sup>278</sup>		44.53 <sup>175</sup>	13.868 <sup>272</sup>		32.07 <sup>142</sup>
15.8	23.782 <sup>472</sup>		48.46 <sup>222</sup>	9.97 <sup>97</sup>		48.46 <sup>209</sup>	30.067 <sup>305</sup>		42.63 <sup>190</sup>	14.167 <sup>299</sup>		33.76 <sup>169</sup>
25.8	24.284 <sup>502</sup>		46.59 <sup>187</sup>	10.99 <sup>102</sup>		46.87 <sup>159</sup>	30.389 <sup>322</sup>		40.63 <sup>200</sup>	14.484 <sup>317</sup>		35.66 <sup>190</sup>
Dec. 5.7	24.801 <sup>517</sup>		45.16 <sup>143</sup>	12.04 <sup>105</sup>		45.82 <sup>105</sup>	30.722 <sup>333</sup>		38.59 <sup>204</sup>	14.813 <sup>329</sup>		37.73 <sup>207</sup>
		518			106			334			331	
			96			45			202			216
15.7	25.319		44.20	13.10		45.37	31.056		36.57	15.144		39.89
25.7	25.823 <sup>504</sup>		43.75 <sup>45</sup>	14.13 <sup>103</sup>		45.50 <sup>13</sup>	31.381 <sup>325</sup>		34.63 <sup>194</sup>	15.466 <sup>322</sup>		42.08 <sup>219</sup>
35.7	26.298 <sup>475</sup>		43.82 <sup>7</sup>	15.10 <sup>97</sup>		46.24 <sup>74</sup>	31.685 <sup>304</sup>		32.85 <sup>178</sup>	15.768 <sup>302</sup>		44.23 <sup>215</sup>
Mean Place	19.572		83.75	4.749		88.04	26.559		62.93	10.837		16.79
Sec δ, Tan δ	1.807		+1.505	4.173		+4.052	1.015		+0.171	1.000		-0.023
Dψ a, Dω a	+0.08		+0.09	+0.10		+0.25	+0.06		+0.01	+0.06		0.00
ψ δ, Dω δ	-0.4		+0.4	-0.4		+0.4	-0.4		+0.4	-0.4		+0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Leonis Minoris. Mag. 5.0		θ Argus. Mag. 3.0		42 Leonis Minoris. Mag. 5.4		η Argus. Var. 1.6-6.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 38 s	° ' " +23 36 "	h m 10 39 s	° ' " -63 57 "	h m 10 41 s	° ' " +31 6 "	h m 10 41 s	° ' " -59 14 "
Jan. 0.7	56.266	70.26 114	61.36	25.64 310	17.195	55.59 85	52.004	43.28 310
10.6	56.580 314	69.12 81	61.85 49	28.74 310	17.529 334	54.74 46	52.439 435	46.38 310
20.6	56.861 281	68.31 47	62.26 41	32.18 344	17.825 296	54.28 6	52.811 372	49.82 344
30.6	57.097 236	67.84 11	62.59 33	35.86 368	18.077 252	54.22 31	53.113 302	53.46 364
Feb. 9.6	57.286 189	67.73 20	62.83 24	39.69 383	18.278 201	54.53 64	53.336 223	57.23 377
19.5	57.422 136	67.93 48	62.98 6	43.56 384	18.424 89	55.17 92	53.480 68	61.02 374
Mar. 1.5	57.506 84	68.41 71	63.04 2	47.40 370	18.513 36	56.09 115	53.548 7	64.76 358
11.5	57.541 35	69.12 87	63.02 11	51.10 348	18.549 12	57.24 128	53.541 74	68.34 337
21.4	57.530 11	69.99 99	62.91 17	54.58 321	18.537 55	58.52 135	53.467 136	71.71 308
31.4	57.482 48	70.98 104	62.74 23	57.79 287	18.482 89	59.87 136	53.331 187	74.79 274
Apr. 10.4	57.400 82	72.02 104	62.51 28	60.66 247	18.393 116	61.23 129	53.144 230	77.53 236
20.4	57.295 105	73.06 97	62.23 32	63.13 203	18.277 134	62.52 117	52.914 263	79.89 192
30.3	57.173 122	74.03 88	61.91 35	65.16 157	18.143 144	63.69 100	52.651 288	81.81 144
May 10.3	57.043 130	74.91 75	61.56 38	66.73 106	17.999 148	64.69 82	52.363 305	83.25 97
20.3	56.911 129	75.66 60	61.18 38	67.79 55	17.851 144	65.51 59	52.058 312	84.22 45
30.3	56.782 121	76.26 42	60.80 38	68.34 3	17.707 136	66.10 34	51.746 311	84.67 4
June 9.2	56.661 108	76.68 23	60.42 37	68.37 50	17.571 123	66.44 10	51.435 301	84.63 53
19.2	56.553 93	76.91 5	60.05 35	67.87 99	17.448 107	66.54 17	51.134 285	84.10 101
29.2	56.460 75	76.96 15	59.70 32	66.88 145	17.341 88	66.37 41	50.849 260	83.09 147
July 9.1	56.385 55	76.81 34	59.38 28	65.43 188	17.253 65	65.96 67	50.589 226	81.62 187
19.1	56.330 32	76.47 53	59.10 23	63.55 225	17.188 42	65.29 90	50.363 185	79.75 222
29.1	56.298 10	75.94 74	58.87 18	61.30 256	17.146 15	64.39 113	50.178 137	77.53 250
Aug. 8.1	56.288 18	75.20 92	58.69 11	58.74 276	17.131 12	63.26 134	50.041 80	75.03 269
18.0	56.306 46	74.28 113	58.58 2	55.98 288	17.143 44	61.92 156	49.961 18	72.34 279
28.0	56.352 77	73.15 132	58.56 5	53.10 289	17.187 75	60.36 174	49.943 51	69.55 279
Sept. 7.0	56.429 110	71.83 150	58.61 14	50.21 279	17.262 112	58.62 192	49.994 123	66.76 268
17.0	56.539 143	70.33 168	58.75 22	47.42 258	17.374 149	56.70 208	50.117 197	64.08 246
26.9	56.682 181	68.65 184	58.97 31	44.84 225	17.523 186	54.62 219	50.314 273	61.62 213
Oct. 6.9	56.863 218	66.81 199	59.28 39	42.59 183	17.709 225	52.43 229	50.587 341	59.49 172
16.9	57.081 253	64.82 209	59.67 46	40.76 134	17.934 264	50.14 234	50.928 406	57.77 122
26.8	57.334 285	62.73 215	60.13 53	39.42 76	18.198 299	47.80 234	51.334 460	56.55 64
Nov. 5.8	57.619 315	60.58 216	60.66 57	38.66 14	18.497 328	45.46 228	51.794 502	55.91 2
15.8	57.934 336	58.42 212	61.23 61	38.52 52	18.825 353	43.18 215	52.296 529	55.89 60
25.8	58.270 352	56.30 202	61.84 61	39.04 115	19.178 368	41.03 198	52.825 539	56.49 123
Dec. 5.7	58.622 353	54.28 184	62.45 59	40.19 176	19.546 372	39.05 172	53.364 532	57.72 183
15.7	58.975 346	52.44 160	63.04 57	41.95 233	19.918 366	37.33 142	53.896 507	59.55 238
25.7	59.321 329	50.84 133	63.61 52	44.28 281	20.284 346	35.91 106	54.403 466	61.93 283
35.7	59.650	49.51	64.13	47.09	20.630	34.85	54.869	64.76
Mean Place	54.375	83.92	59.488	35.70	15.213	71.33	50.234	52.58
Sec δ, Tan δ	1.091	+0.437	2.278	-2.047	1.168	+0.604	1.956	-1.881
D <sub>α</sub> α, D <sub>α</sub> α	+0.07	+0.03	+0.04	-0.13	+0.07	+0.04	+0.05	-0.11
D <sub>δ</sub> δ, D <sub>δ</sub> δ	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3

404

APPARENT PLACES OF STARS, 1917.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Argus. Mag. 2.8			$\gamma$ Leonis. Mag. 5.3			$\delta^2$ Chamaeleon. Mag. 4.6			$\gamma$ Hydrae. Mag. 3.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	10	43	—48 58	10	44	+10 58	10	44	—80 5	10	45	—15 45
	s		"	s		"	s		"	s		"
Jan. 0.7	13.403		46.71	55.517		54.44	64.00		56.53	33.280		33.57
10.6	13.771	368	49.80	55.818	301	52.76	65.05	105	59.37	33.577	297	36.12
20.6	14.089	318	53.14	56.086	268	51.31	65.96	91	62.65	33.840	263	38.68
30.6	14.350	261	56.66	56.314	228	50.15	66.66	70	66.26	34.061	221	41.12
Feb. 9.6	14.550	200	60.23	56.497	183	49.27	67.16	50	70.06	34.237	176	43.44
		184			135			28			129	
19.5	14.684		63.79	56.632		48.69	67.44		74.01	34.366		45.58
Mar. 1.5	14.757	73	67.23	56.718	86	48.39	67.52	8	77.99	34.447	81	47.51
		13			40			14			37	
11.5	14.770		70.50	56.758		48.33	67.38		81.92	34.484		49.17
21.5	14.728	42	73.53	56.758	0	48.50	67.05	33	85.69	34.480	4	50.58
31.4	14.638	90	76.27	56.721	37	48.84	68.55	50	89.24	34.442	38	51.72
		128			67			67			68	
Apr. 10.4	14.510		78.66	56.654		49.31	65.88		92.50	34.374		52.60
20.4	14.348	162	80.67	56.566	88	49.87	65.08	80	95.39	34.286	88	53.21
30.3	14.161	187	82.28	56.463	103	50.48	64.17	91	97.86	34.182	104	53.57
May 10.3	13.957	204	83.44	56.351	112	51.12	63.16	101	99.89	34.069	113	53.68
20.3	13.740	217	84.16	56.236	115	51.75	62.08	108	101.39	33.951	118	53.55
		219			112			113			116	
30.3	13.521		84.41	56.124		52.36	60.95		102.38	33.835		53.20
June 9.2	13.303	218	84.21	56.017	107	52.91	59.82	113	102.80	33.721	114	52.64
19.2	13.094	209	83.56	55.919	98	53.39	58.70	112	102.68	33.617	104	51.89
29.2	12.897	197	82.48	55.835	84	53.80	57.62	108	102.02	33.523	94	50.98
July 9.2	12.720	177	81.02	55.766	69	54.11	56.61	101	100.83	33.442	81	49.92
		152			53			90			63	
19.1	12.568		79.20	55.713		54.31	55.71		99.13	33.379		48.74
29.1	12.446	122	77.09	55.680	33	54.39	54.94	77	97.02	33.335	44	47.52
Aug. 8.1	12.361	85	74.76	55.668	12	54.34	54.34	60	94.54	33.313	22	46.27
		44			13			43			1	
18.0	12.317		72.29	55.681		54.12	53.91		91.75	33.314		45.04
28.0	12.321	4	69.75	55.719	38	53.74	53.70	21	88.79	33.345	31	43.90
		54			68			1			62	
Sept. 7.0	12.375		67.25	55.787		53.18	53.69		85.72	33.407		42.90
17.0	12.484	109	64.89	55.886	99	52.39	53.92	23	82.71	33.502	96	42.10
26.9	12.650	166	62.77	56.017	131	51.40	54.37	45	79.83	33.633	131	41.55
Oct. 6.9	12.873	223	60.98	56.184	167	50.17	55.05	68	77.22	33.802	169	41.33
16.9	13.153	280	59.62	56.387	203	48.74	55.93	88	74.96	34.009	207	41.45
		330			237			105			244	
26.9	13.483		58.75	56.624		47.09	56.98		73.17	34.253		41.93
Nov. 5.8	13.857	374	58.43	56.895	271	45.26	58.20	122	71.95	34.529	276	42.81
15.8	14.267	410	58.69	57.194	299	43.30	59.52	132	71.34	34.834	305	44.08
25.8	14.702	435	59.55	57.513	319	41.25	60.90	138	71.39	35.158	324	45.70
Dec. 5.7	15.146	444	60.99	57.846	333	39.16	62.29	139	72.09	35.495	337	47.64
		440			337			137			340	
15.7	15.586		62.98	58.183		37.11	63.66		73.46	35.835		49.84
25.7	16.009	423	65.44	58.514	331	35.15	64.95	129	75.42	36.166	331	52.22
35.7	16.400	391	68.29	58.828	314	33.35	66.11	116	77.96	36.476	310	54.71
Mean Place	11.758		53.94	53.786		64.66	61.016		68.64	31.690		31.67
Sec $\delta$ , Tan $\delta$	1.524		—1.150	1.019		+0.194	5.819		—5.733	1.039		—0.282
$D\mu a$ , $D\omega a$	+0.05		—0.07	+0.06		+0.01	+0.01		—0.36	+0.06		—0.02
$D\mu \delta$ , $D\omega \delta$	—0.4		+0.3	—0.4		+0.3	—0.4		+0.3	—0.4		+0.3



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	46 Leonis Minoris. Mag. 3.9		54 Leonis. Mag. 4.5		1 Antliae. Mag. 4.7		Groombridge 1706. Mag. 6.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 48 s	° ' +34 39 "	h m 10 51 s	° ' +25 10 "	h m 10 52 s	° ' -36 41 "	h m 10 53 s	° ' +78 12 "
Jan. 0.7	42.459	28.78 76	9.150	79.35 115	52.647	24.65 291	26.65 109	30.81 82
10.6	42.807 348	28.02 35	9.475 325	78.20 80	52.981 334	27.56 291	27.74 109	31.63 82
20.6	43.118 311	27.67 8	9.766 291	77.40 44	53.274 293	30.67 311	28.72 98	33.04 141
30.6	43.384 266	27.75 8	10.016 250	76.96 7	53.520 246	33.86 319	29.55 83	34.96 192
Feb. 9.6	43.598 214	28.21 46	10.218 202	76.89 27	53.716 196	37.06 320	30.20 65	37.30 234
	159	81	150		141	312	46	269
19.5	43.757 101	29.02 111	10.368 98	77.16 55	53.857 88	40.18 298	30.66 24	39.99 291
Mar. 1.5	43.858 44	30.13 132	10.466 49	77.71 81	53.945 37	43.16 279	30.90 2	42.90 299
11.5	43.902 6	31.45 147	10.514 2	78.52 97	53.982 9	45.95 253	30.92 17	45.89 295
21.5	43.896 50	32.92 154	10.516 40	79.49 110	53.973 50	48.48 224	30.75 38	48.84 281
31.4	43.846 89	34.46 152	10.476 73	80.59 115	53.923 84	50.72 194	30.37 54	51.65 254
Apr. 10.4	43.757 117	35.98 144	10.403 97	81.74 114	53.839 109	52.66 158	29.83 67	54.19 218
20.4	43.640 138	37.42 131	10.306 118	82.88 109	53.730 131	54.24 122	29.16 80	56.37 173
30.3	43.502 151	38.73 110	10.188 128	83.97 98	53.599 146	55.46 84	28.36 87	58.10 125
May 10.3	43.351 156	39.83 88	10.060 131	84.95 83	53.453 155	56.30 47	27.49 92	59.35 73
20.3	43.195 154	40.71 62	9.929 131	85.78 66	53.298 158	56.77 8	26.57 93	60.08 16
30.3	43.041 147	41.33 34	9.798 125	86.44 48	53.140 157	56.85 29	25.64 91	60.24 39
June 9.2	42.894 135	41.67 6	9.673 114	86.92 26	52.983 150	56.56 66	24.73 87	59.85 95
19.2	42.759 118	41.73 24	9.559 102	87.18 6	52.833 141	55.90 100	23.86 80	58.90 146
29.2	42.641 101	41.49 51	9.457 85	87.24 15	52.692 126	54.90 132	23.06 72	57.44 195
July 9.2	42.540 77	40.98 79	9.372 65	87.09 38	52.566 107	53.58 159	22.34 61	55.49 236
19.1	42.463 53	40.19 105	9.307 45	86.71 58	52.459 87	51.99 181	21.73 49	53.13 275
29.1	42.410 26	39.14 130	9.262 21	86.13 81	52.372 58	50.18 198	21.24 35	50.38 308
Aug. 8.1	42.384 2	37.84 154	9.241 4	85.32 100	52.314 28	48.20 207	20.89 23	47.30 332
18.0	42.386 35	36.30 175	9.245 33	84.32 122	52.286 8	46.13 208	20.66 8	43.98 352
28.0	42.421 68	34.55 195	9.278 64	83.10 142	52.294 47	44.05 203	20.58 8	40.46 364
Sept. 7.0	42.489 105	32.60 213	9.342 96	81.68 161	52.341 92	42.02 186	20.66 22	36.82 370
17.0	42.594 143	30.47 228	9.438 132	80.07 179	52.433 136	40.16 163	20.88 38	33.12 366
26.9	42.737 183	28.19 238	9.570 170	78.28 195	52.569 184	38.53 130	21.26 54	29.46 355
Oct. 6.9	42.920 225	25.81 245	9.740 207	76.33 210	52.753 230	37.23 91	21.80 67	25.91 339
16.9	43.145 264	23.36 249	9.947 245	74.23 219	52.983 274	36.32 45	22.47 81	22.52 313
26.9	43.409 301	20.87 247	10.192 279	72.04 225	53.257 315	35.87 4	23.28 94	19.39 280
Nov. 5.8	43.710 333	18.40 238	10.471 311	69.79 226	53.572 346	35.91 56	24.22 106	16.59 238
15.8	44.043 361	16.02 222	10.782 335	67.53 220	53.918 372	36.47 109	25.28 113	14.21 191
25.8	44.404 376	13.80 200	11.117 352	65.33 207	54.290 383	37.56 204	26.41 121	12.30 135
Dec. 5.7	44.780 383	11.80 172	11.469 357	63.26 190	54.673 385	39.14 276	27.59 121	10.95 77
15.7	45.163 378	10.08 139	11.826 352	61.36 164	55.058 373	41.18 243	28.80 120	10.18 16
25.7	45.541 362	8.69 100	12.178 336	59.72 135	55.431 351	43.61 276	30.00 115	10.02 46
35.7	45.903	7.69	12.514	58.37	55.782	46.37	31.15	10.48
Mean Place	40.473	45.71	7.318	93.92	51.107	28.88	21.248	54.54
Sec δ, Tan δ	1.216	+0.691	1.105	+0.470	1.247	-0.745	4.894	+4.790
Dψ a, Dω a	+0.07	+0.04	+0.07	+0.03	+0.06	-0.05	+0.10	+0.31
Dψ δ, Dω δ	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Leonis. Mag. 4.7		$p^4$ Leonis. Mag. 5.7		$\psi$ Ursæ Majoris. Mag. 3.2		$\beta$ Crateris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 0 s	° ' " + 7 46 "	h m 11 2 s	° ' " + 2 23 "	h m 11 5 s	° ' " +44 56 "	h m 11 7 s	° ' " -22 22 "
Jan. 0.7	45.824	56.73	41.822	75.32	2.294	36.78	35.890	21.38
10.7	46.130 <sup>306</sup>	54.88 <sup>185</sup>	42.125 <sup>303</sup>	73.29 <sup>208</sup>	2.690 <sup>396</sup>	36.29 <sup>49</sup>	36.206 <sup>316</sup>	24.02 <sup>264</sup>
20.6	46.406 <sup>276</sup>	53.26 <sup>162</sup>	42.399 <sup>274</sup>	71.43 <sup>186</sup>	3.051 <sup>361</sup>	36.30 <sup>1</sup>	36.491 <sup>285</sup>	26.72 <sup>270</sup>
30.6	46.644 <sup>238</sup>	51.88 <sup>138</sup>	42.636 <sup>237</sup>	69.79 <sup>164</sup>	3.364 <sup>313</sup>	36.78 <sup>48</sup>	36.736 <sup>245</sup>	29.41 <sup>269</sup>
Feb. 9.6	46.838 <sup>194</sup>	50.79 <sup>109</sup>	42.830 <sup>194</sup>	68.39 <sup>140</sup>	3.621 <sup>257</sup>	37.71 <sup>93</sup>	36.936 <sup>200</sup>	32.02 <sup>261</sup>
	147	80	148	112	193	132	153	248
19.5	46.985	49.99	42.978	67.27	3.814	39.03	37.069	34.50
Mar. 1.5	47.086 <sup>101</sup>	49.47 <sup>52</sup>	43.079 <sup>101</sup>	66.40 <sup>87</sup>	3.944 <sup>130</sup>	40.67 <sup>164</sup>	37.194 <sup>106</sup>	36.80 <sup>230</sup>
	56	26	57	59	65	186	59	206
11.5	47.142 <sup>14</sup>	49.21 <sup>3</sup>	43.136 <sup>16</sup>	65.81 <sup>35</sup>	4.009 <sup>5</sup>	42.53 <sup>199</sup>	37.253 <sup>18</sup>	38.86 <sup>182</sup>
21.5	47.156 <sup>22</sup>	49.18 <sup>19</sup>	43.152 <sup>19</sup>	65.46 <sup>13</sup>	4.014 <sup>50</sup>	44.52 <sup>203</sup>	37.271 <sup>20</sup>	40.68 <sup>155</sup>
31.4	47.134 <sup>53</sup>	49.37 <sup>33</sup>	43.133 <sup>49</sup>	65.33 <sup>5</sup>	3.964 <sup>96</sup>	46.55 <sup>199</sup>	37.251 <sup>49</sup>	42.23 <sup>127</sup>
Apr. 10.4	47.081	49.70	43.084	65.38	3.868	48.54	37.202	43.50
20.4	47.006 <sup>75</sup>	50.15 <sup>45</sup>	43.012 <sup>72</sup>	65.60 <sup>22</sup>	3.734 <sup>134</sup>	50.40 <sup>186</sup>	37.126 <sup>76</sup>	44.49 <sup>99</sup>
30.4	46.915 <sup>91</sup>	50.69 <sup>54</sup>	42.923 <sup>89</sup>	65.93 <sup>33</sup>	3.571 <sup>163</sup>	52.04 <sup>164</sup>	37.033 <sup>93</sup>	45.20 <sup>71</sup>
May 10.3	46.812 <sup>103</sup>	51.28 <sup>59</sup>	42.823 <sup>100</sup>	66.37 <sup>44</sup>	3.390 <sup>181</sup>	53.42 <sup>138</sup>	36.926 <sup>107</sup>	45.63 <sup>43</sup>
20.3	46.703 <sup>109</sup>	51.90 <sup>62</sup>	42.717 <sup>106</sup>	66.88 <sup>51</sup>	3.198 <sup>192</sup>	54.48 <sup>106</sup>	36.809 <sup>117</sup>	45.77 <sup>14</sup>
	109	61	107	55	195	71	120	13
30.3	46.594	52.51	42.610	67.43	3.003	55.19	36.689	45.64
June 9.2	46.488 <sup>106</sup>	53.10 <sup>59</sup>	42.506 <sup>104</sup>	68.02 <sup>59</sup>	2.813 <sup>190</sup>	55.55 <sup>36</sup>	36.571 <sup>118</sup>	45.25 <sup>39</sup>
19.2	46.389 <sup>99</sup>	53.66 <sup>56</sup>	42.407 <sup>99</sup>	68.62 <sup>60</sup>	2.633 <sup>180</sup>	55.54 <sup>1</sup>	36.455 <sup>116</sup>	44.62 <sup>63</sup>
29.2	46.300 <sup>89</sup>	54.16 <sup>50</sup>	42.318 <sup>89</sup>	69.22 <sup>60</sup>	2.468 <sup>165</sup>	55.14 <sup>40</sup>	36.346 <sup>109</sup>	43.75 <sup>87</sup>
July 9.2	46.223 <sup>77</sup>	54.58 <sup>42</sup>	42.241 <sup>77</sup>	69.80 <sup>58</sup>	2.325 <sup>143</sup>	54.38 <sup>76</sup>	36.248 <sup>98</sup>	42.69 <sup>106</sup>
	62	34	63	53	120	111	85	124
19.1	46.161	54.92	42.178	70.33	2.205	53.27	36.163	41.45
29.1	46.115 <sup>46</sup>	55.15 <sup>23</sup>	42.131 <sup>47</sup>	70.79 <sup>46</sup>	2.110 <sup>95</sup>	51.84 <sup>143</sup>	36.095 <sup>68</sup>	40.10 <sup>135</sup>
Aug. 8.1	46.090 <sup>25</sup>	55.26 <sup>11</sup>	42.104 <sup>27</sup>	71.16 <sup>37</sup>	2.047 <sup>63</sup>	50.10 <sup>174</sup>	36.047 <sup>48</sup>	38.67 <sup>143</sup>
	4	3	6	26	29	202	22	146
18.1	46.086 <sup>22</sup>	55.23 <sup>20</sup>	42.098 <sup>20</sup>	71.42 <sup>9</sup>	2.018 <sup>7</sup>	48.08 <sup>225</sup>	36.025 <sup>4</sup>	37.21 <sup>143</sup>
28.0	46.108 <sup>49</sup>	55.03 <sup>40</sup>	42.118 <sup>46</sup>	71.51 <sup>7</sup>	2.025 <sup>45</sup>	45.83 <sup>246</sup>	36.029 <sup>37</sup>	35.78 <sup>133</sup>
Sept. 7.0	46.157	54.63	42.164	71.44	2.070	43.37	36.066	34.45
17.0	46.239 <sup>82</sup>	54.04 <sup>59</sup>	42.242 <sup>78</sup>	71.16 <sup>28</sup>	2.157 <sup>87</sup>	40.72 <sup>265</sup>	36.139 <sup>73</sup>	33.30 <sup>115</sup>
26.9	46.354 <sup>115</sup>	53.21 <sup>83</sup>	42.355 <sup>113</sup>	70.66 <sup>50</sup>	2.290 <sup>133</sup>	37.94 <sup>278</sup>	36.251 <sup>112</sup>	32.37 <sup>93</sup>
Oct. 6.9	46.505 <sup>151</sup>	52.14 <sup>107</sup>	42.504 <sup>149</sup>	69.89 <sup>77</sup>	2.470 <sup>180</sup>	35.09 <sup>285</sup>	36.404 <sup>153</sup>	31.75 <sup>62</sup>
16.9	46.691 <sup>186</sup>	50.84 <sup>130</sup>	42.689 <sup>185</sup>	68.87 <sup>102</sup>	2.697 <sup>227</sup>	32.20 <sup>289</sup>	36.598 <sup>194</sup>	31.48 <sup>27</sup>
	224	153	221	130	274	286	234	11
26.9	46.915	49.31	42.910	67.57	2.971	29.34	36.832	31.59
Nov. 5.8	47.174 <sup>259</sup>	47.56 <sup>175</sup>	43.166 <sup>256</sup>	66.02 <sup>155</sup>	3.290 <sup>319</sup>	26.57 <sup>277</sup>	37.105 <sup>273</sup>	32.12 <sup>53</sup>
15.8	47.462 <sup>288</sup>	45.65 <sup>191</sup>	43.452 <sup>286</sup>	64.26 <sup>176</sup>	3.649 <sup>359</sup>	23.98 <sup>259</sup>	37.410 <sup>305</sup>	33.08 <sup>96</sup>
25.8	47.774 <sup>312</sup>	43.61 <sup>204</sup>	43.763 <sup>311</sup>	62.31 <sup>195</sup>	4.040 <sup>391</sup>	21.61 <sup>237</sup>	37.739 <sup>329</sup>	34.45 <sup>137</sup>
Dec. 5.8	48.102 <sup>328</sup>	41.48 <sup>213</sup>	44.088 <sup>325</sup>	60.21 <sup>210</sup>	4.454 <sup>414</sup>	19.56 <sup>205</sup>	38.084 <sup>345</sup>	36.18 <sup>173</sup>
	335	211	333	215	426	167	351	208
15.7	48.437	39.37	44.421	58.06	4.880	17.89	38.435	38.26
25.7	48.769 <sup>332</sup>	37.30 <sup>207</sup>	44.750 <sup>329</sup>	55.91 <sup>215</sup>	5.305 <sup>425</sup>	16.64 <sup>125</sup>	38.781 <sup>346</sup>	40.60 <sup>234</sup>
35.7	49.085 <sup>316</sup>	35.36 <sup>194</sup>	45.065 <sup>315</sup>	53.84 <sup>207</sup>	5.714 <sup>409</sup>	15.86 <sup>78</sup>	39.111 <sup>330</sup>	43.14 <sup>254</sup>
Mean Place	44.205	66.38	40.246	83.26	0.238	56.81	34.425	21.40
Sec $\delta$ , Tan $\delta$	1.009	+0.137	1.001	+0.042	1.413	+0.998	1.081	-0.412
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	+0.01	+0.06	0.00	+0.07	+0.06	+0.06	-0.03
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.4	+0.3	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ Leonis. Mag. 4.1		π Centauri. Mag. 4.3		ι Leonis. Mag. 4.0		τ Leonis. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 16 s	° ' " + 6 28 "	h m 11 17 s	° ' " -54 2 "	h m 11 19 s	° ' " +10 58 "	h m 11 23 s	° ' " + 3 18 "
Jan. 0.7	52.979	54.51	14.455	0.98	37.419	60.56	41.618	40.02
10.7	53.291 <sup>312</sup>	52.59 <sup>192</sup>	14.890 <sup>435</sup>	3.77 <sup>279</sup>	37.737 <sup>318</sup>	58.76 <sup>180</sup>	41.932 <sup>314</sup>	37.99 <sup>203</sup>
20.6	53.577 <sup>286</sup>	50.87 <sup>172</sup>	15.279 <sup>389</sup>	6.90 <sup>313</sup>	38.027 <sup>290</sup>	57.22 <sup>154</sup>	42.221 <sup>289</sup>	36.13 <sup>186</sup>
30.6	53.826 <sup>249</sup>	49.39 <sup>148</sup>	15.610 <sup>331</sup>	10.27 <sup>337</sup>	38.282 <sup>255</sup>	55.96 <sup>126</sup>	42.474 <sup>253</sup>	34.51 <sup>162</sup>
Feb. 9.6	54.034 <sup>208</sup>	48.20 <sup>119</sup>	15.880 <sup>270</sup>	13.81 <sup>354</sup>	38.495 <sup>213</sup>	54.99 <sup>97</sup>	42.687 <sup>213</sup>	33.13 <sup>138</sup>
	163	91	203	359	169	65	169	110
19.6	54.197	47.29	16.083	17.40	38.664	54.34	42.856	32.03
Mar. 1.5	54.314 <sup>117</sup>	46.68 <sup>61</sup>	16.218 <sup>135</sup>	20.98 <sup>358</sup>	38.785 <sup>121</sup>	54.00 <sup>34</sup>	42.979 <sup>123</sup>	31.22 <sup>81</sup>
	73	34	70	347	77	8	80	55
11.5	54.387	46.34	16.288	24.45	38.862	53.92	43.059	30.67
	31	10	10	330	34	18	38	29
21.5	54.418	46.24	16.298	27.75	38.896	54.10	43.097	30.38
	5	12	46	306	3	36	2	8
31.4	54.413	46.36	16.252	30.81	38.893	54.46	43.099	30.30
	37	28	96	277	36	53	30	12
Apr. 10.4	54.376	46.64	16.156	33.58	38.857	54.99	43.069	30.42
	62	42	137	243	61	64	54	29
20.4	54.314	47.06	16.019	36.01	38.796	55.63	43.015	30.71
	81	52	173	205	81	72	75	40
30.4	54.233	47.58	15.846	38.06	38.715	56.35	42.940	31.11
May 10.3	54.140 <sup>93</sup>	48.17 <sup>59</sup>	15.645 <sup>201</sup>	39.69 <sup>163</sup>	38.621 <sup>94</sup>	57.08 <sup>73</sup>	42.852 <sup>88</sup>	31.59 <sup>48</sup>
	101	62	221	119	102	73	97	56
20.3	54.039	48.79	15.424	40.88	38.519	57.81	42.755	32.15
	104	63	236	73	107	69	101	60
30.3	53.935	49.42	15.188	41.61	38.412	58.50	42.654	32.75
June 9.3	53.831 <sup>104</sup>	50.04 <sup>62</sup>	14.944 <sup>244</sup>	41.87 <sup>26</sup>	38.305 <sup>107</sup>	59.14 <sup>64</sup>	42.552 <sup>102</sup>	33.36 <sup>61</sup>
	100	59	246	21	102	57	99	61
19.2	53.731	50.63	14.698	41.66	38.203	59.71	42.453	33.97
	93	54	240	67	95	47	94	59
29.2	53.638	51.17	14.458	40.99	38.108	60.18	42.359	34.56
July 9.2	53.555 <sup>83</sup>	51.65 <sup>48</sup>	14.230 <sup>228</sup>	39.87 <sup>112</sup>	38.022 <sup>86</sup>	60.53 <sup>35</sup>	42.274 <sup>85</sup>	35.12 <sup>56</sup>
	70	39	208	152	73	24	73	50
19.1	53.485	52.04	14.022	38.35	37.949	60.77	42.201	35.62
	57	30	182	188	58	11	60	42
29.1	53.428	52.34	13.840	36.47	37.891	60.88	42.141	36.04
Aug. 8.1	53.390 <sup>38</sup>	52.51 <sup>17</sup>	13.693 <sup>147</sup>	34.28 <sup>219</sup>	37.851 <sup>40</sup>	60.84 <sup>4</sup>	42.097 <sup>44</sup>	36.36 <sup>32</sup>
	17	4	105	240	19	22	23	19
18.1	53.373	52.55	13.588	31.88	37.832	60.62	42.074	36.55
	5	14	56	256	3	38	0	5
28.0	53.378	52.41	13.532	29.32	37.835	60.24	42.074	36.60
	35	32	1	261	33	59	28	14
Sept. 7.0	53.413	52.09	13.533	26.71	37.868	59.65	42.102	36.46
	65	52	61	255	63	81	59	34
17.0	53.478	51.57	13.594	24.16	37.931	58.84	42.161	36.12
	98	76	126	240	96	102	91	56
27.0	53.576	50.81	13.720	21.76	38.027	57.82	42.252	35.56
Oct. 6.9	53.712 <sup>136</sup>	49.81 <sup>100</sup>	13.915 <sup>195</sup>	19.62 <sup>214</sup>	38.161 <sup>134</sup>	56.56 <sup>126</sup>	42.381 <sup>129</sup>	34.74 <sup>82</sup>
	173	125	260	179	172	148	167	108
16.9	53.885	48.56	14.175	17.83	38.333	55.08	42.548	33.66
	211	148	325	134	210	170	205	133
26.9	54.096	47.08	14.500	16.49	38.543	53.38	42.753	32.33
Nov. 5.8	54.344 <sup>248</sup>	45.37 <sup>171</sup>	14.881 <sup>381</sup>	15.66 <sup>83</sup>	38.790 <sup>247</sup>	51.51 <sup>187</sup>	42.996 <sup>243</sup>	30.75 <sup>158</sup>
	279	189	429	26	279	203	275	179
15.8	54.623	43.48	15.310	15.40	39.069	49.48	43.271	28.96
	307	204	464	33	307	215	303	197
25.8	54.930	41.44	15.774	15.73	39.376	47.33	43.574	26.99
Dec. 5.8	55.254 <sup>324</sup>	39.31 <sup>213</sup>	16.259 <sup>485</sup>	16.66 <sup>93</sup>	39.703 <sup>327</sup>	45.16 <sup>217</sup>	43.897 <sup>323</sup>	24.88 <sup>211</sup>
	335	216	491	151	337	215	333	216
15.7	55.589	37.15	16.750	18.17	40.040	43.01	44.230	22.72
	334	211	482	204	337	206	333	216
25.7	55.923	35.04	17.232	20.21	40.377	40.95	44.563	20.56
	322	200	455	251	328	191	324	207
35.7	56.245	33.04	17.687	22.72	40.705	39.04	44.887	18.49
Mean Place	51.460	64.09	12.999	9.66	35.891	71.67	40.156	48.67
Sec δ, Tan δ	1.006	+0.114	1.703	-1.378	1.019	+0.194	1.002	+0.058
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.06	+0.01	+0.05	-0.09	+0.06	+0.01	+0.08	0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Draconis. Mag. 4.1		ξ Hydræ. Mag. 3.7		λ Centauri. Mag. 3.3		υ Leonis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 26 s	° ' " +69 46 "	h m 11 28 s	° ' " -31 23 "	h m 11 31 s	° ' " -62 33 "	h m 11 32 s	° ' " - 0 21 "
Jan. 0.7	32.52	56.70	56.346	51.29	58.05	27.40	43.336	62.91
10.7	33.24 72	56.84 14	56.690 344	53.93 264	58.59 54	29.97 257	43.654 318	65.03 212
20.6	33.91 67	57.58 74	57.004 314	56.73 280	59.07 48	32.95 298	43.945 291	67.02 199
30.6	34.50 59	58.89 131	57.279 275	59.62 289	59.49 42	36.25 330	44.203 258	68.82 180
Feb. 9.6	34.98 48	60.72 183	57.509 230	62.53 291	59.84 35	39.81 356	44.422 219	70.38 156
	38	226	181	284	27	368	176	132
19.6	35.36	62.98	57.690	65.37	60.11	43.49	44.598	71.70
Mar. 1.5	35.62 26	65.56 258	57.823 133	68.09 272	60.30 19	47.22 373	44.730 132	72.73 103
11.5	35.75 13	68.35 279	57.907 84	70.62 253	60.41 11	50.92 370	44.818 88	73.50 77
21.5	35.75 0	71.22 287	57.947 40	72.95 233	60.44 3	54.49 357	44.866 48	74.02 52
31.5	35.63 12	74.07 285	57.948 1	75.01 206	60.40 4	57.88 339	44.877 11	74.30 28
	21	270	35	180	11	314	21	8
Apr. 10.4	35.42	76.77	57.913	76.81	60.29	61.02	44.856	74.38
20.4	35.11 31	79.22 245	57.849 64	78.31 150	60.13 16	63.84 282	44.810 46	74.28 10
30.4	34.73 38	81.33 211	57.762 87	79.49 118	59.92 21	66.30 246	44.743 67	74.03 25
May 10.3	34.28 45	83.03 170	57.657 105	80.36 87	59.67 25	68.35 205	44.662 81	73.66 37
20.3	33.80 48	84.26 123	57.537 120	80.90 54	59.38 29	69.95 160	44.571 91	73.20 46
	50	74	128	21	31	112	97	54
30.3	33.30	85.00	57.409	81.11	59.07	71.07	44.474	72.66
June 9.3	32.80 50	85.21 21	57.276 133	81.00 11	58.74 33	71.69 62	44.374 100	72.08 58
19.2	32.30 50	84.90 31	57.142 134	80.57 43	58.40 34	71.81 12	44.275 99	71.46 62
29.2	31.82 48	84.07 83	57.011 131	79.83 74	58.07 33	71.43 38	44.180 95	70.82 64
July 9.2	31.39 43	82.74 133	56.888 123	78.82 101	57.74 33	70.55 88	44.092 88	70.19 63
	39	179	113	127	31	134	79	60
19.2	31.00	80.95	56.775	77.55	57.43	69.21	44.013	69.59
29.1	30.66 34	78.73 222	56.676 99	76.08 147	57.16 27	67.46 175	43.948 65	69.03 56
Aug. 8.1	30.39 27	76.13 260	56.598 78	74.43 165	56.93 23	65.32 214	43.897 51	68.55 48
18.1	30.20 19	73.21 292	56.544 54	72.70 173	56.74 19	62.89 243	43.866 31	68.17 38
28.0	30.08 12	70.02 319	56.520 24	70.93 177	56.62 12	60.24 265	43.856 10	67.93 24
	3	340	10	174	5	276	19	9
Sept. 7.0	30.05	66.62	56.530	69.19	56.57	57.48	43.875	67.84
17.0	30.10 5	63.07 355	56.578 48	67.57 162	56.60 3	54.69 279	43.923 48	67.95 11
27.0	30.24 14	59.44 363	56.670 92	66.14 143	56.73 13	51.99 270	44.006 83	68.30 35
Oct. 6.9	30.47 23	55.81 363	56.808 138	64.98 116	56.93 20	49.50 249	44.126 120	68.90 60
16.9	30.80 33	52.27 354	56.993 185	64.16 82	57.22 29	47.33 217	44.285 159	69.76 86
	43	341	231	42	37	177	199	115
26.9	31.23	48.86	57.224	63.74	57.59	45.56	44.484	70.91
Nov. 5.9	31.74 51	45.70 316	57.498 274	63.75 1	58.04 45	44.28 128	44.720 236	72.32 141
15.8	32.33 59	42.85 285	57.811 313	64.23 48	58.55 51	43.56 72	44.992 272	73.99 167
25.8	32.99 66	40.40 245	58.154 343	65.18 95	59.12 57	43.45 11	45.292 300	75.87 188
Dec. 5.8	33.70 71	38.43 197	58.517 363	66.57 139	59.70 58	43.97 52	45.612 320	77.91 204
	74	143	373	182	60	112	332	215
15.7	34.44	37.00	58.890	68.39	60.30	45.09	45.944	80.06
25.7	35.19 75	36.15 85	59.260 370	70.57 218	60.88 58	46.81 172	46.278 334	82.25 219
35.7	35.93 74	35.92 23	59.616 356	73.05 248	61.45 57	49.06 225	46.603 325	84.40 215
Mean Place	29.629	81.55	55.004	54.02	56.642	37.87	41.941	55.34
Sec δ, Tan δ	2.894	+2.716	1.172	-0.610	2.170	-1.926	1.000	-0.006
Dψ α, Dω α	+0.07	+0.18	+0.06	-0.04	+0.05	-0.13	+0.06	0.00
Dψ δ, Dω δ	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1

**FOR THE UPPER TRANSIT AT WASHINGTON.**

### APPARENT PLACES OF STARS, 1917.

**FOR THE UPPER TRANSIT AT**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Virginis. Mag. 4.6			$\omicron$ Virginis. Mag. 4.2			$\delta$ Centauri. Mag. 2.9			$\epsilon$ Corvi. Mag. 3.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m		° '	h m		° '	h m		° '	h m		° '
	11	56	+ 7 4	12	0	+ 9 11	12	4	-50 15	12	5	-22 9
	s		"	s		"	s		"	s		"
Jan. 0.7	38.464		27.24	60.174		26.68	4.108		29.24	52.358		30.00
10.7	38.792	328	25.24	60.504	330	24.72	4.555	447	31.57	52.702	344	32.36
20.7	39.098	306	23.46	60.812	308	23.00	4.971	416	34.27	53.025	323	34.81
30.6	39.376	278	21.94	61.093	281	21.55	5.345	374	37.25	53.317	292	37.30
Feb. 9.6	39.616	240	20.70	61.337	244	20.41	5.668	323	40.42	53.571	254	39.76
		199			204			268			213	
19.6	39.815		19.76	61.541		19.59	5.936		43.70	53.784		42.11
Mar. 1.6	39.971	156	19.14	61.701	160	19.10	6.146	210	47.02	53.954	170	44.33
11.5	40.085	114	18.82	61.818	117	18.89	6.296	150	50.30	54.080	126	46.35
21.5	40.157	72	18.76	61.894	76	18.96	6.391	95	53.47	54.165	85	48.15
31.5	40.190	33	18.94	61.931	37	19.28	6.434	43	56.46	54.212	47	49.74
		1			4			6			12	
Apr. 10.5	40.191		19.30	61.935		19.77	6.428		59.24	54.224		51.08
20.4	40.162	29	19.82	61.909	26	20.40	6.379	49	61.74	54.206	18	52.17
30.4	40.112	50	20.45	61.861	48	21.15	6.291	88	63.94	54.164	42	53.02
May 10.4	40.043	69	21.15	61.793	68	21.94	6.170	121	65.78	54.101	63	53.61
20.3	39.960	83	21.87	61.711	82	22.75	6.022	148	67.23	54.021	80	53.96
		92			92			172			92	
30.3	39.868		22.61	61.619		23.54	5.850		68.29	53.929		54.07
June 9.3	39.771	97	23.31	61.521	98	24.29	5.661	189	68.93	53.826	103	53.95
19.3	39.671	100	23.97	61.420	101	24.96	5.459	202	69.13	53.717	109	53.59
29.2	39.571	100	24.57	61.318	102	25.55	5.250	209	68.89	53.605	112	53.02
July 9.2	39.475	96	25.08	61.219	99	26.04	5.041	209	68.23	53.493	112	52.25
		90			93			204			108	
19.2	39.385		25.50	61.126		26.41	4.837		67.17	53.385		51.31
29.2	39.305	80	25.80	61.042	84	26.64	4.647	190	65.75	53.284	101	50.23
Aug. 8.1	39.239	66	25.95	60.971	71	26.73	4.478	169	63.98	53.195	89	49.03
18.1	39.188	51	25.96	60.916	55	26.65	4.337	141	61.94	53.125	70	47.79
28.1	39.158	30	25.79	60.882	34	26.37	4.234	103	59.72	53.076	49	46.52
		5			11			58			21	
Sept. 7.0	39.153		25.44	60.871		25.90	4.176		57.37	53.055		45.31
17.0	39.178	25	24.88	60.891	20	25.21	4.171	5	54.99	53.068	13	44.19
27.0	39.236	58	24.09	60.944	53	24.30	4.225	54	52.68	53.119	51	43.23
Oct. 7.0	39.331	95	23.06	61.034	90	23.14	4.342	117	50.54	53.212	93	42.51
16.9	39.467	136	21.77	61.165	131	21.75	4.525	183	48.66	53.350	138	42.06
		176			172			247			184	
26.9	39.643		20.26	61.337		20.12	4.772		47.14	53.534		41.96
Nov. 5.9	39.859	216	18.52	61.550	213	18.28	5.081	309	46.05	53.763	229	42.22
15.9	40.114	255	16.59	61.802	252	16.27	5.446	365	45.46	54.033	270	42.87
25.8	40.400	286	14.50	62.086	284	14.11	5.856	410	45.40	54.338	305	43.91
Dec. 5.8	40.713	313	12.32	62.398	312	11.89	6.300	444	45.90	54.670	332	45.30
		329			329			463			350	
15.8	41.042		10.11	62.727		9.66	6.763		46.95	55.020		47.04
25.7	41.378	336	7.94	63.063	336	7.48	7.232	469	48.52	55.375	355	49.06
35.7	41.711	333	5.87	63.396	333	5.44	7.689	457	50.56	55.725	350	51.30
Mean Place	37.180		37.72	58.908		37.95	2.987		37.19	51.206		29.59
Sec $\delta$ , Tan $\delta$	1.008		+0.124	1.013		+0.162	1.564		-1.203	1.080		-0.407
$D_{\psi} a$ , $D_{\omega} a$	+0.06		+0.01	+0.06		+0.01	+0.06		-0.08	+0.06		-0.03
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.4		0.0	-0.4		0.0	-0.4		0.0	-0.4		0.0



**FOR THE UPPER TRANSIT AT**

**NEWSPAPER**



FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	20 Comae. Mag. 5.7		δ Corvi. Mag. 3.1		γ Crucis. Mag. 1.6		8 Canum Venat. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 25 s	° ' +21 20 "	h m 12 25 s	° ' -16 3 "	h m 12 26 s	° ' -56 38 "	h m 12 29 s	° ' +41 47 "
Jan. 0.7	34.365	64.53	35.120	15.13	33.971	44.91	49.531	68.22
10.7	34.711 346	62.71 182	35.461 341	17.37 224	34.490 519	46.90 199	49.933 402	66.83 139
20.7	35.043 332	61.26 145	35.786 325	19.65 228	34.979 489	49.34 244	50.321 388	65.96 87
30.7	35.349 306	60.19 107	36.083 297	21.92 227	35.426 447	52.12 278	50.680 359	65.62 34
Feb. 9.6	35.622 273	59.53 66	36.347 264	24.11 219	35.821 395	55.19 307	51.002 322	65.82 20
	234	25	227	204	337	326	276	71
19.6	35.856	59.28	36.574	26.15	36.158	58.45	51.278	66.53
Mar. 1.6	36.046 190	59.41 13	36.760 186	28.03 188	36.431 273	61.81 336	51.502 224	67.70 117
11.6	36.192 146	59.89 48	36.905 145	29.69 166	36.642 211	65.21 340	51.671 169	69.26 156
21.5	36.294 102	60.69 80	37.009 104	31.14 145	36.790 148	68.56 335	51.784 113	71.12 186
31.5	36.354 60	61.72 103	37.076 67	32.35 121	36.875 85	71.81 325	51.844 60	73.21 209
	23	122	34	99	29	305	10	220
Apr. 10.5	36.377	62.94	37.110	33.34	36.904	74.86	51.854	75.41
20.4	36.366 11	64.26 132	37.114 4	34.10 76	36.878 26	77.70 284	51.819 35	77.64 223
30.4	36.328 38	65.62 136	37.092 22	34.65 55	36.805 73	80.26 256	51.745 74	79.79 215
May 10.4	36.265 63	66.97 135	37.049 43	34.99 34	36.689 116	82.49 223	51.639 106	81.81 202
20.4	36.185 80	68.25 128	36.987 62	35.13 14	36.534 155	84.37 188	51.508 131	83.61 180
	95	115	77	5	186	147	152	151
30.3	36.090	69.40	36.910	35.08	36.348	85.84	51.356	85.12
June 9.3	35.984 106	70.41 101	36.821 89	34.85 23	36.132 216	86.88 104	51.189 167	86.32 120
19.3	35.871 113	71.24 83	36.724 97	34.47 38	35.895 237	87.47 59	51.014 175	87.17 85
29.3	35.754 117	71.85 61	36.621 103	33.93 54	35.643 252	87.60 13	50.835 179	87.64 47
July 9.2	35.639 115	72.25 40	36.514 107	33.25 68	35.382 261	87.27 33	50.657 178	87.72 8
	114	15	106	78	257	78	173	31
19.2	35.525	72.40	36.408	32.47	35.125	86.49	50.484	87.41
29.2	35.417 108	72.31 9	36.306 102	31.59 88	34.875 250	85.28 121	50.323 161	86.70 71
Aug. 8.1	35.320 97	71.97 34	36.213 93	30.65 94	34.644 231	83.69 159	50.175 148	85.62 108
18.1	35.237 83	71.37 60	36.133 80	29.69 96	34.444 200	81.76 193	50.048 127	84.18 144
28.1	35.175 62	70.52 85	36.073 60	28.74 95	34.283 161	79.55 221	49.944 104	82.39 179
	40	111	35	89	111	240	73	211
Sept. 7.1	35.135	69.41	36.038	27.85	34.172	77.15	49.871	80.28
17.0	35.126 9	68.05 136	36.032 6	27.09 76	34.120 52	74.64 251	49.835 36	77.89 239
27.0	35.151 25	66.43 162	36.062 30	26.49 60	34.136 16	72.11 253	49.840 5	75.25 264
Oct. 7.0	35.214 63	64.59 184	36.133 71	26.10 39	34.226 90	69.68 243	49.891 51	72.40 285
17.0	35.319 105	62.52 207	36.248 115	25.99 11	34.393 167	67.47 221	49.992 101	69.37 303
	150	225	159	19	246	192	153	311
26.9	35.469	60.27	36.407	26.18	34.639	65.55	50.145	66.26
Nov. 5.9	35.663 194	57.87 240	36.612 205	26.69 51	34.958 319	64.02 153	50.351 206	63.12 314
15.9	35.899 236	55.38 249	36.859 247	27.55 86	35.345 387	62.95 107	50.609 258	60.01 311
25.8	36.174 275	52.84 254	37.143 284	28.74 119	35.789 444	62.42 53	50.914 305	57.03 298
Dec. 5.8	36.482 308	50.33 251	37.457 314	30.23 149	36.279 490	62.45 3	51.258 244	54.25 278
	331	241	334	178	518	59	375	249
15.8	36.813	47.92	37.791	32.01	36.797	63.04	51.633	51.76
25.8	37.158 345	45.69 223	38.136 345	34.00 199	37.328 531	64.19 115	52.029 396	49.65 211
35.7	37.506 348	43.72 197	38.481 345	36.16 216	37.856 528	65.87 168	52.430 401	47.97 168
Mean Place	33.217	80.18	34.065	12.48	33.028	54.24	48.338	89.82
Sec δ, Tan δ	1.074	+0.391	1.041	-0.288	1.819	-1.520	1.341	+0.894
Dψ a, Dω a	+0.06	+0.03	+0.06	-0.02	+0.07	-0.10	+0.06	+0.06
Dψ δ, Dω δ	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Draconis. Mag. 3.9		$\beta$ Corvi. Mag. 2.8		$\delta$ Comæ seq. Mag. 5.2		$\alpha$ Muscæ. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 29 s	° ' " +70 13 "	h m 12 30 s	° ' " -22 56 "	h m 12 30 s	° ' " +18 49 "	h m 12 32 s	° ' " -68 40 "
Jan. 0.7	58.43	77.66 69	2.421	16.71	59.134	46.63 189	13.88	30.62 171
10.7	59.18 75	76.97 3	2.774 353	18.93 222	59.477 343	44.74 154	14.61 73	32.33 223
20.7	59.91 73	76.94 61	3.111 337	21.28 240	59.807 330	42.02 118	15.31 64	34.56 267
30.7	60.59 68	77.55 122	3.420 309	23.68 239	60.112 305	41.22 80	15.95 56	37.23 304
Feb. 9.6	61.20 52	78.77 177	3.696 276	26.07 231	60.385 273	40.83 2	16.51 49	40.27 332
19.6	61.72 42	80.54 224	3.933 196	28.38 219	60.621 193	40.81 34	17.00 39	43.59 352
Mar. 1.6	62.14 29	82.78 260	4.129 153	30.57 201	60.814 150	41.15 65	17.39 30	47.11 362
11.6	62.43 18	85.38 285	4.282 113	32.58 184	60.964 107	41.80 89	17.69 21	50.73 364
21.5	62.61 6	88.23 298	4.395 74	34.42 161	61.071 66	42.69 108	17.90 12	54.37 380
31.5	62.67 7	91.21 299	4.469 41	36.03 139	61.137 30	43.77 122	18.02 4	57.97 347
Apr. 10.5	62.60 18	94.20 288	4.510 8	37.42 115	61.167 3	44.99 127	18.06 6	61.44 328
20.4	62.42 26	97.08 266	4.518 19	38.57 93	61.164 32	46.26 128	18.00 13	64.72 302
30.4	62.16 35	99.74 236	4.499 42	39.50 68	61.132 54	47.54 123	17.87 20	67.74 270
May 10.4	61.81 42	102.10 197	4.457 62	40.18 45	61.078 74	48.77 112	17.67 26	70.44 234
20.4	61.39 47	104.07 152	4.395 79	40.63 21	61.004 89	49.89 101	17.41 32	72.78 192
30.3	60.92 51	105.59 103	4.316 92	40.84 1	60.915 100	50.90 85	17.09 37	74.70 146
June 9.3	60.41 52	106.62 51	4.224 103	40.83 24	60.815 108	51.75 65	16.72 40	76.16 97
19.3	59.89 53	107.13 3	4.121 111	40.59 44	60.707 112	52.40 46	16.32 43	77.13 45
29.3	59.36 53	107.10 55	4.010 114	40.15 65	60.595 114	52.86 23	15.89 45	77.58 6
July 9.2	58.83 50	106.55 107	3.896 115	39.50 82	60.481 112	53.09 2	15.44 44	77.52 57
19.2	58.33 48	105.48 156	3.781 112	38.68 97	60.369 107	53.11 23	15.00 43	76.95 107
29.2	57.85 43	103.92 203	3.669 104	37.71 110	60.262 98	52.88 46	14.57 40	75.88 154
Aug. 8.1	57.42 37	101.89 245	3.565 89	36.61 120	60.164 86	52.42 72	14.17 36	74.34 196
18.1	57.05 31	99.44 282	3.476 69	35.41 122	60.078 65	51.70 96	13.81 29	72.38 231
28.1	56.74 24	96.62 315	3.407 44	34.19 120	60.013 43	50.74 121	13.52 22	70.07 259
Sept. 7.1	56.50 15	93.47 342	3.363 12	32.99 113	59.970 14	49.53 146	13.30 12	67.48 276
17.0	56.35 6	90.05 360	3.351 26	31.86 99	59.956 20	48.07 170	13.18 1	64.72 285
27.0	56.29 3	86.45 373	3.377 69	30.87 79	59.976 58	46.37 192	13.17 9	61.87 281
Oct. 7.0	56.32 13	82.72 378	3.446 114	30.08 54	60.034 99	44.45 214	13.26 21	59.06 266
17.0	56.45 24	78.94 375	3.560 162	29.54 23	60.133 143	42.31 230	13.47 33	56.40 241
26.9	56.69 35	75.19 363	3.722 209	29.31 12	60.276 187	40.01 241	13.80 43	53.99 203
Nov. 5.9	57.04 44	71.56 340	3.931 253	29.43 48	60.463 231	37.60 247	14.23 54	51.96 158
15.9	57.48 54	68.16 310	4.184 293	29.91 86	60.694 270	35.13 248	14.77 62	50.38 105
25.8	58.02 62	65.06 271	4.477 324	30.77 123	60.964 302	32.65 240	15.39 69	49.33 45
Dec. 5.8	58.64 68	62.35 223	4.801 346	32.00 157	61.266 326	30.25 226	16.08 73	48.88 14
15.8	59.32 72	60.12 168	5.147 357	33.57 186	61.592 340	27.99 202	16.81 75	49.02 75
25.8	60.04 75	58.44 106	5.504 356	35.43 210	61.932 345	25.97	17.56 74	49.77 136
35.7	60.79	57.38	5.860	37.53	62.277		18.30	51.13
Mean Place	56.924	104.25	1.405	16.40	58.031	61.51	13.073	42.18
Sec $\delta$ , Tan $\delta$	2.958	+2.784	1.086	-0.423	1.057	+0.341	2.751	-2.562
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.05	+0.18	+0.06	-0.03	+0.06	+0.02	+0.07	-0.17
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Virginis. Mag. 4.8			$\gamma$ Centauri. Mag. 2.4			$\gamma$ Virginis (mean). Mag. 2.9			$\rho$ Virginis. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	12	34	— 7 32	12	36	—48 30	12	37	— 0 59	12	37	+10 41
	s		"	s		"	s		"	s		"
Jan. 0.7	58.654		26.06	56.856		7.72	28.306		47.69	42.086		21.69
10.7	58.990 <sup>336</sup>		28.22 <sup>216</sup>	57.308 <sup>452</sup>		9.70 <sup>198</sup>	28.639 <sup>333</sup>		49.81 <sup>212</sup>	42.424 <sup>338</sup>		19.68 <sup>201</sup>
20.7	59.312 <sup>322</sup>		30.35 <sup>213</sup>	57.740 <sup>432</sup>		12.05 <sup>235</sup>	28.959 <sup>320</sup>		51.82 <sup>201</sup>	42.748 <sup>324</sup>		17.90 <sup>178</sup>
30.7	59.609 <sup>297</sup>		32.38 <sup>203</sup>	58.137 <sup>397</sup>		14.72 <sup>267</sup>	29.255 <sup>296</sup>		53.67 <sup>185</sup>	43.048 <sup>300</sup>		16.42 <sup>148</sup>
Feb. 9.6	59.875 <sup>266</sup>		34.24 <sup>186</sup>	58.492 <sup>355</sup>		17.60 <sup>288</sup>	29.520 <sup>265</sup>		55.28 <sup>161</sup>	43.318 <sup>270</sup>		15.26 <sup>116</sup>
	231		165	307		304	231		137	236		81
19.6	60.106		35.89	58.799		20.64	29.751		56.65	43.554		14.45
Mar. 1.6	60.297 <sup>191</sup>		37.32 <sup>143</sup>	59.053 <sup>254</sup>		23.73 <sup>309</sup>	29.942 <sup>191</sup>		57.73 <sup>108</sup>	43.749 <sup>195</sup>		13.97 <sup>48</sup>
11.6	60.448 <sup>151</sup>		38.50 <sup>118</sup>	59.254 <sup>201</sup>		26.83 <sup>310</sup>	30.094 <sup>152</sup>		58.53 <sup>80</sup>	43.903 <sup>154</sup>		13.83 <sup>14</sup>
21.5	60.560 <sup>112</sup>		39.44 <sup>94</sup>	59.402 <sup>148</sup>		29.85 <sup>302</sup>	30.206 <sup>112</sup>		59.07 <sup>54</sup>	44.016 <sup>113</sup>		14.00 <sup>17</sup>
31.5	60.636 <sup>76</sup>		40.12 <sup>68</sup>	59.499 <sup>97</sup>		32.76 <sup>291</sup>	30.282 <sup>76</sup>		59.35 <sup>28</sup>	44.091 <sup>75</sup>		14.41 <sup>41</sup>
	44		47	49		273	44		7	40		64
Apr. 10.5	60.680		40.59	59.548		35.49	30.326		59.42	44.131		15.05
20.4	60.693 <sup>13</sup>		40.85 <sup>26</sup>	59.554 <sup>6</sup>		37.99 <sup>250</sup>	30.338 <sup>12</sup>		59.30 <sup>12</sup>	44.140 <sup>9</sup>		15.83 <sup>78</sup>
30.4	60.678 <sup>15</sup>		40.93 <sup>8</sup>	59.519 <sup>35</sup>		40.23 <sup>224</sup>	30.324 <sup>14</sup>		59.01 <sup>29</sup>	44.121 <sup>19</sup>		16.73 <sup>90</sup>
May 10.4	60.643 <sup>35</sup>		40.84 <sup>9</sup>	59.448 <sup>71</sup>		42.17 <sup>194</sup>	30.289 <sup>35</sup>		58.60 <sup>41</sup>	44.080 <sup>41</sup>		17.68 <sup>95</sup>
20.4	60.590 <sup>53</sup>		40.61 <sup>23</sup>	59.344 <sup>104</sup>		43.77 <sup>160</sup>	30.234 <sup>55</sup>		58.09 <sup>51</sup>	44.020 <sup>60</sup>		18.65 <sup>97</sup>
	70		35	131		124	70		58	76		95
30.3	60.520		40.26	59.213		45.01	30.164		57.51	43.944		19.60
June 9.3	60.439 <sup>81</sup>		39.81 <sup>45</sup>	59.058 <sup>155</sup>		45.87 <sup>86</sup>	30.083 <sup>81</sup>		56.89 <sup>62</sup>	43.856 <sup>88</sup>		20.49 <sup>89</sup>
19.3	60.349 <sup>90</sup>		39.28 <sup>53</sup>	58.884 <sup>174</sup>		46.34 <sup>47</sup>	29.993 <sup>90</sup>		56.25 <sup>64</sup>	43.760 <sup>96</sup>		21.30 <sup>81</sup>
29.3	60.252 <sup>97</sup>		38.68 <sup>60</sup>	58.695 <sup>189</sup>		46.39 <sup>5</sup>	29.896 <sup>97</sup>		55.60 <sup>65</sup>	43.658 <sup>102</sup>		21.98 <sup>68</sup>
July 9.2	60.150 <sup>102</sup>		38.03 <sup>65</sup>	58.497 <sup>198</sup>		46.03 <sup>36</sup>	29.795 <sup>101</sup>		54.97 <sup>63</sup>	43.552 <sup>106</sup>		22.55 <sup>57</sup>
	102		67	200		75	102		60	105		42
19.2	60.048		37.36	58.297		45.28	29.693		54.37	43.447		22.97
29.2	59.949 <sup>99</sup>		36.67 <sup>69</sup>	58.102 <sup>195</sup>		44.16 <sup>112</sup>	29.594 <sup>99</sup>		53.82 <sup>55</sup>	43.345 <sup>102</sup>		23.22 <sup>25</sup>
Aug. 8.1	59.857 <sup>92</sup>		35.99 <sup>68</sup>	57.919 <sup>183</sup>		42.70 <sup>146</sup>	29.502 <sup>92</sup>		53.35 <sup>47</sup>	43.251 <sup>94</sup>		23.31 <sup>9</sup>
18.1	59.777 <sup>80</sup>		35.36 <sup>63</sup>	57.757 <sup>162</sup>		40.94 <sup>176</sup>	29.420 <sup>82</sup>		52.98 <sup>37</sup>	43.168 <sup>83</sup>		23.21 <sup>10</sup>
28.1	59.715 <sup>62</sup>		34.81 <sup>55</sup>	57.625 <sup>132</sup>		38.96 <sup>198</sup>	29.356 <sup>64</sup>		52.73 <sup>25</sup>	43.102 <sup>66</sup>		22.90 <sup>31</sup>
	41		45	95		215	43		11	44		52
Sept. 7.1	59.674		34.36	57.530		36.81	29.313		52.62	43.058		22.38
17.0	59.662 <sup>12</sup>		34.08 <sup>28</sup>	57.484 <sup>46</sup>		34.58 <sup>223</sup>	29.297 <sup>16</sup>		52.69 <sup>7</sup>	43.041 <sup>17</sup>		21.63 <sup>75</sup>
27.0	59.683 <sup>21</sup>		33.97 <sup>11</sup>	57.491 <sup>7</sup>		32.36 <sup>222</sup>	29.314 <sup>17</sup>		52.98 <sup>29</sup>	43.056 <sup>15</sup>		20.65 <sup>98</sup>
Oct. 7.0	59.743 <sup>60</sup>		34.09 <sup>12</sup>	57.559 <sup>68</sup>		30.25 <sup>211</sup>	29.370 <sup>56</sup>		53.50 <sup>52</sup>	43.109 <sup>53</sup>		19.42 <sup>123</sup>
17.0	59.844 <sup>101</sup>		34.47 <sup>38</sup>	57.692 <sup>133</sup>		28.34 <sup>191</sup>	29.465 <sup>95</sup>		54.28 <sup>78</sup>	43.201 <sup>92</sup>		17.95 <sup>147</sup>
	145		66	199		162	138		102	137		170
26.9	59.989		35.13	57.891		26.72	29.603		55.30	43.338		16.25
Nov. 5.9	60.177 <sup>188</sup>		36.07 <sup>94</sup>	58.154 <sup>263</sup>		25.47 <sup>125</sup>	29.786 <sup>183</sup>		56.60 <sup>130</sup>	43.519 <sup>181</sup>		14.34 <sup>191</sup>
15.9	60.409 <sup>232</sup>		37.30 <sup>123</sup>	58.477 <sup>323</sup>		24.67 <sup>80</sup>	30.011 <sup>225</sup>		58.15 <sup>155</sup>	43.742 <sup>223</sup>		12.24 <sup>210</sup>
25.8	60.679 <sup>270</sup>		38.81 <sup>151</sup>	58.851 <sup>374</sup>		24.35 <sup>32</sup>	30.274 <sup>263</sup>		59.92 <sup>177</sup>	44.004 <sup>262</sup>		10.02 <sup>222</sup>
Dec. 5.8	60.980 <sup>301</sup>		40.56 <sup>175</sup>	59.266 <sup>415</sup>		24.55 <sup>20</sup>	30.569 <sup>295</sup>		61.87 <sup>195</sup>	44.298 <sup>294</sup>		7.73 <sup>229</sup>
	322		194	444		72	317		210	318		231
15.8	61.302		42.50	59.710		25.27	30.886		63.97	44.616		5.42
25.8	61.637 <sup>335</sup>		44.58 <sup>208</sup>	60.168 <sup>458</sup>		26.50 <sup>123</sup>	31.216 <sup>330</sup>		66.11 <sup>214</sup>	44.949 <sup>333</sup>		3.17 <sup>225</sup>
35.7	61.975 <sup>338</sup>		46.72 <sup>214</sup>	60.626 <sup>458</sup>		28.20 <sup>170</sup>	31.550 <sup>334</sup>		68.25 <sup>214</sup>	45.285 <sup>336</sup>		1.06 <sup>211</sup>
Mean Place	57.636		20.34	55.952		15.08	27.290		39.62	41.049		33.89
Sec $\delta$ , Tan $\delta$	1.009		−0.132	1.509		−1.131	1.000		−0.017	1.018		+0.189
$D_{\gamma} a, D_{\alpha} a$	+0.06		−0.01	+0.07		−0.07	+0.06		0.00	+0.07		+0.01
$D_{\gamma} \delta, D_{\alpha} \delta$	−0.4		−0.2	−0.4		−0.2	−0.4		−0.2	−0.4		−0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	76 Ursæ Majoris. Mag. 5.9			β Crucis. Mag. 1.5			31 Comæ. Mag. 5.1			η Centauri. Mag. 4.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	12	37	+63 9	12	42	−59 13	12	47	+27 58	12	48	−39 43
	s		"	s		"	s		"	s		"
Jan. 0.8	57.89		41.04	52.445		57.35	40.405		73.63	50.925		34.90
10.7	58.48	59	40.07	53.004	559	59.09	40.765	360	71.82	51.335	410	36.87
20.7	59.06	58	39.73	53.537	533	61.30	41.113	348	70.40	51.727	392	39.13
30.7	59.60	54	40.03	54.031	494	63.91	41.442	329	69.44	52.092	365	41.64
Feb. 9.6	60.08	48	40.95	54.475	444	66.82	41.740	298	68.94	52.423	331	44.30
		42			385			260			289	
19.6	60.50		42.42	54.860		69.97	42.000		68.91	52.712		47.04
Mar. 1.6	60.84	34	44.39	55.180	320	73.27	42.217	217	69.32	52.956	244	49.81
		25			256			173			197	
11.6	61.09	17	46.75	55.436	188	76.65	42.390	127	70.12	53.153	152	52.53
21.5	61.26	8	49.41	55.624	124	80.02	42.517	83	71.26	53.305	107	55.15
31.5	61.34	3	52.23	55.748	62	83.33	42.600	44	72.66	53.412	66	57.64
Apr. 10.5	61.31	9	55.11	55.810	4	86.50	42.644	5	74.26	53.478	29	59.94
20.5	61.22	16	57.93	55.814	52	89.46	42.649	27	75.96	53.507	6	62.02
30.4	61.06	23	60.59	55.762	101	92.19	42.622	54	77.70	53.501	38	63.87
May 10.4	60.83	28	63.00	55.661	146	94.60	42.568	79	79.40	53.463	90	65.43
20.4	60.55	31	65.06	55.515	185	96.67	42.489	97	80.99	53.397	144	66.71
30.3	60.24	35	66.72	55.330	221	98.36	42.392	113	82.43	53.307	113	67.68
June 9.3	59.89	36	67.92	55.109	250	99.62	42.279	122	83.67	53.194	130	68.32
19.3	59.53	37	68.65	54.859	271	100.44	42.157	130	84.67	53.064	145	68.62
29.3	59.16	37	68.88	54.588	284	100.80	42.027	135	85.39	52.919	155	68.59
July 9.2	58.79	36	68.59	54.304	288	100.69	41.892	134	85.84	52.764	159	68.21
19.2	58.43	34	67.80	54.016	284	100.11	41.758	130	85.98	52.605	159	67.51
29.2	58.09	31	66.52	53.732	266	99.08	41.628	122	85.81	52.446	151	66.51
Aug. 8.2	57.78	28	64.79	53.466	240	97.64	41.506	109	85.34	52.295	137	65.23
18.1	57.50	23	62.62	53.226	200	95.82	41.397	91	84.55	52.158	114	63.72
28.1	57.27	18	60.06	53.026	149	93.68	41.306	67	83.46	52.044	84	62.02
Sept. 7.1	57.09	12	57.18	52.877	87	91.31	41.239	39	82.08	51.960	46	60.21
17.0	56.97	5	53.99	52.790	16	88.78	41.200	5	80.40	51.914	0	58.35
27.0	56.92	2	50.58	52.774	64	86.20	41.195	35	78.47	51.914	51	56.52
Oct. 7.0	56.94	10	46.99	52.838	147	83.66	41.230	79	76.28	51.965	107	54.82
17.0	57.04	18	43.31	52.985	232	81.28	41.309	125	73.89	52.072	165	53.30
26.9	57.22	26	39.63	53.217	315	79.17	41.434	173	71.31	52.237	222	52.08
Nov. 5.9	57.48	34	36.01	53.532	389	77.42	41.607	220	68.60	52.459	276	51.19
15.9	57.82	42	32.56	53.921	455	76.09	41.827	264	65.82	52.735	325	50.70
25.9	58.24	48	29.36	54.376	508	75.27	42.091	301	63.04	53.060	364	50.67
Dec. 5.8	58.72	53	26.50	54.884	545	75.00	42.392	330	60.32	53.424	392	51.10
15.8	59.25	57	24.08	55.429	563	75.30	42.722	350	57.77	53.816	408	51.99
25.8	59.82	59	22.18	55.992	564	76.17	43.072	357	55.44	54.224	411	53.32
35.7	60.41		20.85	56.556		77.59	43.429		53.42	54.635		55.05
Mean Place	56.652		66.88	51.646		67.14	39.407		91.52	50.062		39.77
Sec δ, Tan δ	2.215		+1.976	1.955		−1.680	1.132		+0.531	1.300		−0.831
Dψ α, Dω α	+0.05		+0.13	+0.07		−0.11	+0.06		+0.03	+0.07		−0.05
Dψ δ, Dω δ	−0.4		−0.2	−0.4		−0.2	−0.4		−0.2	−0.4		−0.2





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Virginis. Mag. 3.0		θ Virginis. Mag. 4.4		43 Comæ. Mag. 4.3		20 Canum Venat. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 58 s	° ' +11 23 "	h m 13 5 s	° ' - 5 5 "	h m 13 8 s	° ' +28 17 "	h m 13 13 s	° ' +40 59 "
Jan. 0.8	3.623	65.41	39.882	53.04	0.960	37.03	50.216	72.15
10.7	3.961 <sup>338</sup>	63.36 <sup>205</sup>	40.220 <sup>338</sup>	55.13 <sup>209</sup>	1.318 <sup>358</sup>	35.12 <sup>191</sup>	50.611 <sup>395</sup>	70.33 <sup>182</sup>
20.7	4.289 <sup>328</sup>	61.55 <sup>181</sup>	40.549 <sup>329</sup>	57.17 <sup>204</sup>	1.668 <sup>350</sup>	33.62 <sup>150</sup>	51.002 <sup>391</sup>	69.03 <sup>130</sup>
30.7	4.597 <sup>308</sup>	60.04 <sup>151</sup>	40.858 <sup>309</sup>	59.09 <sup>192</sup>	2.003 <sup>335</sup>	32.57 <sup>105</sup>	51.378 <sup>376</sup>	68.28 <sup>75</sup>
Feb. 9.7	4.880 <sup>283</sup>	58.87 <sup>117</sup>	41.143 <sup>285</sup>	60.82 <sup>173</sup>	2.310 <sup>307</sup>	31.99 <sup>58</sup>	51.726 <sup>348</sup>	68.09 <sup>19</sup>
	249	82	252	152	273	9	310	35
19.6	5.129	58.05	41.395	62.34	2.583	31.90	52.036	68.44
Mar. 1.6	5.340 <sup>211</sup>	57.59 <sup>46</sup>	41.612 <sup>217</sup>	63.61 <sup>127</sup>	2.818 <sup>235</sup>	32.27 <sup>37</sup>	52.304 <sup>268</sup>	69.31 <sup>87</sup>
11.6	5.512 <sup>172</sup>	57.48 <sup>11</sup>	41.791 <sup>179</sup>	64.63 <sup>102</sup>	3.009 <sup>191</sup>	33.05 <sup>78</sup>	52.522 <sup>218</sup>	70.65 <sup>134</sup>
21.6	5.644 <sup>132</sup>	57.68 <sup>20</sup>	41.934 <sup>143</sup>	65.38 <sup>75</sup>	3.156 <sup>147</sup>	34.20 <sup>115</sup>	52.690 <sup>168</sup>	72.37 <sup>172</sup>
31.5	5.740 <sup>96</sup>	58.15 <sup>47</sup>	42.041 <sup>107</sup>	65.89 <sup>51</sup>	3.259 <sup>103</sup>	35.64 <sup>144</sup>	52.807 <sup>117</sup>	74.39 <sup>202</sup>
	59	72	73	28	63	167	66	222
Apr. 10.5	5.799	58.87	42.114	66.17	3.322	37.31	52.873	76.61
20.5	5.826 <sup>27</sup>	59.74 <sup>87</sup>	42.157 <sup>43</sup>	66.25 <sup>8</sup>	3.347 <sup>25</sup>	39.11 <sup>180</sup>	52.894 <sup>21</sup>	78.94 <sup>233</sup>
30.4	5.826 <sup>0</sup>	60.72 <sup>98</sup>	42.172 <sup>15</sup>	66.16 <sup>9</sup>	3.339 <sup>8</sup>	40.96 <sup>185</sup>	52.873 <sup>21</sup>	81.28 <sup>234</sup>
May 10.4	5.800 <sup>26</sup>	61.77 <sup>106</sup>	42.163 <sup>9</sup>	65.91 <sup>25</sup>	3.300 <sup>39</sup>	42.79 <sup>183</sup>	52.814 <sup>59</sup>	83.55 <sup>227</sup>
20.4	5.753 <sup>47</sup>	62.84 <sup>107</sup>	42.131 <sup>32</sup>	65.56 <sup>35</sup>	3.235 <sup>65</sup>	44.54 <sup>175</sup>	52.723 <sup>91</sup>	85.65 <sup>210</sup>
	66	104	49	45	87	160	119	189
30.4	5.687	63.88	42.082	65.11	3.148	46.14	52.604	87.54
June 9.3	5.607 <sup>80</sup>	64.86 <sup>98</sup>	42.015 <sup>67</sup>	64.59 <sup>52</sup>	3.044 <sup>104</sup>	47.55 <sup>141</sup>	52.463 <sup>141</sup>	89.14 <sup>160</sup>
19.3	5.515 <sup>92</sup>	65.75 <sup>89</sup>	41.935 <sup>80</sup>	64.01 <sup>58</sup>	2.924 <sup>120</sup>	48.71 <sup>116</sup>	52.303 <sup>160</sup>	90.40 <sup>126</sup>
29.3	5.414 <sup>101</sup>	66.52 <sup>77</sup>	41.844 <sup>91</sup>	63.40 <sup>61</sup>	2.793 <sup>131</sup>	49.61 <sup>90</sup>	52.131 <sup>172</sup>	91.30 <sup>90</sup>
July 9.3	5.306 <sup>108</sup>	67.15 <sup>63</sup>	41.744 <sup>100</sup>	62.77 <sup>63</sup>	2.655 <sup>138</sup>	50.22 <sup>61</sup>	51.951 <sup>180</sup>	91.81 <sup>51</sup>
	112	47	106	62	141	30	185	11
19.2	5.194	67.62	41.638	62.15	2.514	50.52	51.766	91.92
29.2	5.083 <sup>111</sup>	67.91 <sup>29</sup>	41.530 <sup>108</sup>	61.54 <sup>61</sup>	2.372 <sup>142</sup>	50.51 <sup>1</sup>	51.581 <sup>185</sup>	91.63 <sup>29</sup>
Aug. 8.2	4.977 <sup>106</sup>	68.03 <sup>12</sup>	41.425 <sup>105</sup>	60.96 <sup>58</sup>	2.235 <sup>137</sup>	50.17 <sup>34</sup>	51.404 <sup>177</sup>	90.92 <sup>71</sup>
18.1	4.879 <sup>98</sup>	67.95 <sup>8</sup>	41.327 <sup>98</sup>	60.45 <sup>51</sup>	2.108 <sup>127</sup>	49.51 <sup>66</sup>	51.239 <sup>165</sup>	89.82 <sup>110</sup>
28.1	4.795 <sup>84</sup>	67.65 <sup>30</sup>	41.241 <sup>86</sup>	60.03 <sup>42</sup>	1.997 <sup>111</sup>	48.54 <sup>97</sup>	51.091 <sup>148</sup>	88.34 <sup>148</sup>
	63	51	65	30	92	130	123	184
Sept. 7.1	4.732	67.14	41.176	59.73	1.905	47.24	50.968	86.50
17.1	4.694 <sup>38</sup>	66.38 <sup>76</sup>	41.135 <sup>41</sup>	59.58 <sup>15</sup>	1.842 <sup>63</sup>	45.65 <sup>159</sup>	50.876 <sup>92</sup>	84.32 <sup>218</sup>
27.0	4.687 <sup>7</sup>	65.39 <sup>99</sup>	41.126 <sup>9</sup>	59.60 <sup>2</sup>	1.813 <sup>29</sup>	43.78 <sup>187</sup>	50.821 <sup>55</sup>	81.84 <sup>248</sup>
Oct. 7.0	4.717 <sup>30</sup>	64.14 <sup>125</sup>	41.154 <sup>28</sup>	59.85 <sup>25</sup>	1.822 <sup>9</sup>	41.64 <sup>214</sup>	50.811 <sup>10</sup>	79.10 <sup>274</sup>
17.0	4.788 <sup>71</sup>	62.66 <sup>148</sup>	41.223 <sup>69</sup>	60.33 <sup>48</sup>	1.874 <sup>52</sup>	39.27 <sup>237</sup>	50.850 <sup>39</sup>	76.13 <sup>297</sup>
	116	172	115	75	100	257	94	313
26.9	4.904	60.94	41.338	61.08	1.974	36.70	50.944	73.00
Nov. 5.9	5.065 <sup>161</sup>	59.01 <sup>193</sup>	41.499 <sup>161</sup>	62.09 <sup>101</sup>	2.124 <sup>150</sup>	33.99 <sup>271</sup>	51.091 <sup>147</sup>	69.77 <sup>323</sup>
15.9	5.270 <sup>205</sup>	56.88 <sup>213</sup>	41.704 <sup>205</sup>	63.38 <sup>129</sup>	2.322 <sup>198</sup>	31.18 <sup>281</sup>	51.294 <sup>203</sup>	66.51 <sup>326</sup>
25.9	5.516 <sup>246</sup>	54.63 <sup>225</sup>	41.951 <sup>247</sup>	64.92 <sup>154</sup>	2.566 <sup>244</sup>	28.35 <sup>283</sup>	51.550 <sup>256</sup>	63.32 <sup>319</sup>
Dec. 5.8	5.797 <sup>281</sup>	52.30 <sup>233</sup>	42.232 <sup>281</sup>	66.66 <sup>174</sup>	2.849 <sup>283</sup>	25.58 <sup>277</sup>	51.853 <sup>303</sup>	60.28 <sup>304</sup>
	310	234	310	192	318	263	343	282
15.8	6.107	49.96	42.542	68.58	3.167	22.95	52.196	57.46
25.8	6.433 <sup>326</sup>	47.68 <sup>228</sup>	42.869 <sup>327</sup>	70.61 <sup>203</sup>	3.507 <sup>340</sup>	20.53 <sup>242</sup>	52.566 <sup>370</sup>	54.98 <sup>248</sup>
35.8	6.768 <sup>335</sup>	45.53 <sup>215</sup>	43.204 <sup>335</sup>	72.70 <sup>209</sup>	3.860 <sup>353</sup>	18.42 <sup>211</sup>	52.956 <sup>390</sup>	52.90 <sup>208</sup>
Mean Place	2.714	77.96	39.035	46.26	0.119	55.05	49.448	93.61
Sec δ, Tan δ	1.020	+0.202	1.004	-0.089	1.136	+0.538	1.325	+0.869
Dψ α, Dω α	+0.06	+0.01	+0.06	-0.01	+0.06	+0.03	+0.05	+0.08
Dψ δ, Dω δ	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3



**422. APPARENT PLACES OF STARS, 1917.**

**FOR THE UPPER TRANSIT AT WASHINGTON.**

1

**FOR THE UPPER TRANSIT AT WASHINGTON.**

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	ε Centauri. Mag. 2.6		m Virginis. Mag. 5.2		τ Boötis. Mag. 4.5		η Ursæ Majoris. (Alkaid.) Mag. 1.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 34 s	° ' " -53 2 "	h m 13 37 s	° ' " - 8 17 "	h m 13 43 s	° ' " +17 51 "	h m 13 44 s	° ' " +49 42 "
Jan. 0.8	37.607	34.11	15.868	10.32	19.678	57.21	16.726	74.54
10.8	38.113 <sup>506</sup>	35.32 <sup>121</sup>	16.207 <sup>339</sup>	12.31 <sup>199</sup>	20.015 <sup>337</sup>	55.08 <sup>213</sup>	17.155 <sup>429</sup>	72.56 <sup>198</sup>
20.7	38.610 <sup>497</sup>	36.96 <sup>164</sup>	16.542 <sup>335</sup>	14.28 <sup>197</sup>	20.351 <sup>336</sup>	53.22 <sup>186</sup>	17.591 <sup>436</sup>	71.15 <sup>141</sup>
30.7	39.089 <sup>479</sup>	38.98 <sup>202</sup>	16.865 <sup>323</sup>	16.18 <sup>190</sup>	20.678 <sup>327</sup>	51.72 <sup>150</sup>	18.019 <sup>428</sup>	70.33 <sup>82</sup>
Feb. 9.7	39.536 <sup>447</sup>	41.31 <sup>233</sup>	17.167 <sup>302</sup>	17.94 <sup>176</sup>	20.985 <sup>307</sup>	50.62 <sup>110</sup>	18.425 <sup>406</sup>	70.13 <sup>20</sup>

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	39 Virginis. Mag. 5.1			5 Centauri. Mag. 3.1			17 Boötis. Mag. 2.8			θ Apodis. Var. 5.5-6.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.			
	h	m	'	h	m	'	h	m	'			
	13	45	-17 43	13	50	-46 52	13	50	+18 48			
			"			"			"			
Jan. 0.8	22.101		18.71	21.669		43.34	44.523		33.19			
10.8	22.450	349	20.53	22.126	457	44.50	44.860	337	31.00	219		
20.8	22.798	348	22.45	22.579	453	46.05	45.198	338	29.11	189		
30.8	23.134	336	24.39	23.017	438	47.92	45.528	330	27.59	152		
Feb. 9.7	23.448	314	26.30	23.432	415	50.06	45.839	311	26.48	111		
19.7	23.737	289	28.13	23.813	381	52.41	46.126	287	25.80	66		
Mar. 1.6	23.994	257	29.82	24.156	343	54.91	46.381	255	25.55	25		
11.6	24.217	223	31.36	24.456	300	57.49	46.602	221	25.72	17		
21.6	24.406	180	32.72	24.711	255	60.09	46.787	186	26.27	55		
31.6	24.560	154	33.88	24.921	210	62.66	46.934	147	27.15	88		
		120			165			111		117		
Apr. 10.5	24.680	90	34.85	25.086	121	65.17	47.045	77	28.32			
20.5	24.770	59	35.62	25.207	79	67.56	47.122	45	29.68	136		
30.5	24.829	31	36.23	25.286	37	69.79	47.167	14	31.17	149		
May 10.4	24.860	5	36.66	25.323	2	71.83	47.181	13	32.73	156		
20.4	24.865	20	36.92	25.321	40	73.65	47.168	38	34.30	152		
30.4	24.845	42	37.04	25.281	77	75.21	47.130	60	35.82	141		
June 9.4	24.803	64	37.01	25.204	110	76.48	47.070	81	37.23	127		
19.3	24.739	83	36.83	25.094	138	77.45	46.989	99	38.50	108		
29.3	24.656	99	36.53	24.956	165	78.07	46.890	114	39.58	87		
July 9.3	24.557	112	36.12	24.791	185	78.34	46.776	125	40.45	63		
19.3	24.445	122	35.59	24.608	198	78.25	46.651	133	41.08	39		
29.3	24.323	126	34.97	24.408	204	77.82	46.518	137	41.47	12		
Aug. 8.2	24.197	125	34.25	24.204	201	77.02	46.381	134	41.59	16		
18.2	24.072	116	33.48	24.003	188	75.90	46.247	127	41.43	42		
28.1	23.956	101	32.69	23.815	164	74.50	46.120	113	41.01	72		
Sept. 7.1	23.855	78	31.90	23.651	130	72.84	46.007	92	40.00			
17.1	23.777	48	31.16	23.521	85	71.00	45.915	64	39.30	99		
27.1	23.729	10	30.51	23.436	31	69.06	45.851	29	38.01	129		
Oct. 7.0	23.719	34	29.99	23.405	29	67.08	45.822	12	36.45	166		
17.0	23.753	81	29.66	23.434	97	65.16	45.834	57	34.63	207		
27.0	23.834	131	29.55	23.531	164	63.38	46.891	104	32.56	226		
Nov. 6.0	23.965	181	29.71	23.695	233	61.83	45.995	154	30.28	245		
15.9	24.146	228	30.14	23.928	295	60.59	46.149	201	27.83	258		
25.9	24.374	270	30.88	24.223	350	59.72	46.350	245	25.25	262		
Dec. 5.9	24.644	305	31.90	24.573	396	59.25	46.595	280	22.63	260		
15.8	24.949	328	33.21	24.828	428	59.24	46.875	310	20.03	250		
25.8	25.277	344	34.74	25.397	448	59.68	47.185	327	17.53	233		
35.8	25.621		36.46	25.845		60.57	47.512		15.20			
Mean Place	21.487		16.12	21.223		49.39	43.968		47.97		11.699	48.82
Sec δ, Tan δ	1.050		-0.320	1.463		-1.068	1.056		+0.341		4.253	-4.134
D <sub>α</sub> α, D <sub>α</sub> α	+0.06		-0.02	+0.07		-0.06	+0.06		+0.02		+0.11	-0.24
D <sub>δ</sub> δ, D <sub>δ</sub> δ	-0.4		-0.4	-0.4		-0.5	-0.4		-0.5		-0.3	-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Boötis. Mag. 6.1			τ Virginis. Mag. 4.3			β Centauri. Mag. 0.9			π Hydree. Mag. 3.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	13	57	+27 46	13	57	+ 1 56	13	57	-59 58	14	1	-26 16
	s		"	s		"	s		"	s		"
Jan. 0.8	25.195		55.66	25.821		35.33	57.425		14.73	38.954		59.14
10.8	25.542	347	53.45	26.151	330	33.27	58.012	587	15.45	39.320	366	60.69
20.7	25.893	351	51.62	26.482	331	31.33	58.599	587	16.65	39.686	366	62.43
30.7	26.238	345	50.23	26.804	322	29.57	59.172	573	18.29	40.042	356	64.28
Feb. 9.7	26.566	328	49.32	27.109	305	28.06	59.716	544	20.32	40.381	339	66.21
		302			283			505			313	
19.7	26.868		48.92	27.392		26.83	60.221		22.67	40.694		68.14
Mar. 1.6	27.139	271	49.02	27.644	252	25.90	60.678	457	25.30	40.979	285	70.04
11.6	27.375	236	49.58	27.865	221	25.29	61.081	403	28.10	41.229	250	71.85
21.6	27.572	197	50.55	28.055	190	24.98	61.427	346	31.03	41.444	215	73.55
31.6	27.729	157	51.90	28.209	154	24.94	61.712	285	34.03	41.625	181	75.12
		118			122			225			147	
Apr. 10.5	27.847		53.54	28.331		25.17	61.937		37.03	41.772		76.54
20.5	27.926	79	55.37	28.423	92	25.59	62.101	164	39.97	41.884	112	77.80
30.5	27.971	45	57.32	28.484	61	26.18	62.205	104	42.80	41.966	82	78.87
May 10.4	27.982	11	59.32	28.518	34	26.91	62.249	44	45.45	42.017	51	79.78
20.4	27.962	20	61.29	28.527	9	27.71	62.235	14	47.90	42.038	21	80.51
		47			16			69			6	
30.4	27.915		63.16	28.511		28.56	62.166		50.07	42.032		81.08
June 9.4	27.841	74	64.86	28.473	38	29.42	62.044	122	51.93	41.997	35	81.46
19.3	27.746	95	66.36	28.415	58	30.26	61.873	171	53.44	41.939	58	81.65
29.3	27.630	116	67.60	28.337	78	31.07	61.657	216	54.55	41.856	83	81.66
July 9.3	27.498	132	68.56	28.243	94	31.80	61.405	252	55.24	41.754	102	81.47
		144			107			281			120	
19.3	27.354		69.21	28.136		32.46	61.124		55.49	41.634		81.13
29.2	27.201	153	69.53	28.018	118	33.02	60.822	302	55.30	41.502	132	80.59
Aug. 8.2	27.045	156	69.53	27.896	122	33.47	60.513	309	54.66	41.361	141	79.89
18.2	26.890	155	69.17	27.773	123	33.79	60.209	304	53.58	41.221	140	79.06
28.1	26.742	148	68.48	27.656	117	33.96	59.922	287	52.11	41.086	135	78.11
		133			105			253			120	
Sept. 7.1	26.609		67.44	27.551		33.97	59.669		50.30	40.966		77.09
17.1	26.499	110	63.09	27.466	85	33.79	59.463	206	48.19	40.866	100	76.03
27.1	26.417	82	64.40	27.408	58	33.42	59.318	145	45.87	40.801	65	74.99
Oct. 7.0	26.370	47	62.41	27.383	25	32.81	59.245	73	43.43	40.773	28	74.02
17.0	26.366	4	60.16	27.398	15	31.98	59.255	10	40.96	40.790	17	73.18
		43			59			99			69	
27.0	26.409		57.65	27.457		30.90	59.354		38.57	40.859		72.53
Nov. 6.0	26.504	95	54.96	27.564	107	29.59	59.545	191	36.37	40.981	122	72.11
15.9	26.649	145	52.12	27.718	154	28.03	59.827	282	34.44	41.157	176	71.99
25.9	26.844	195	49.20	27.918	200	26.27	60.192	365	32.88	41.384	227	72.17
Dec. 5.9	27.086	242	46.28	28.160	242	24.35	60.631	439	31.75	41.657	273	72.66
		282			276			501			311	
15.8	27.368		43.45	28.436		22.31	61.132		31.10	41.968		73.49
25.8	27.683	315	40.80	28.741	305	20.21	61.679	547	30.97	42.307	339	74.62
35.8	28.018	335	38.39	29.062	321	18.12	62.254	575	31.35	42.666	359	76.00
Mean Place	24.729		73.03	25.268		44.56	57.232		23.52	38.444		59.18
Sec δ, Tan δ	1.130		+0.527	1.001		+0.034	1.999		-1.730	1.115		-0.494
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.05		+0.03	+0.06		0.00	+0.08		-0.10	+0.07		-0.03
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.3		-0.5	-0.3		-0.5	-0.3		-0.5	-0.3		-0.5

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 Ursæ Minoris. Mag. 5.0		ι Virginis. Mag. 4.2		α Boötis. (Arcturus.) Mag. 0.2		λ Boötis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 9	° ' " +77 55	h m 14 11	° ' " - 5 36	h m 14 11	° ' " +19 36	h m 14 13	° ' " +46 27
	s	"	s	"	s	"	s	"
Jan. 0.8	7.19	49.09 178	40.075	24.49	52.913	35.66	13.934	46.66 226
10.8	8.21 102	47.31 116	40.405 330	26.43 194	53.242 329	33.36 230	14.330 396	44.40 175
20.8	9.30 109	46.15 48	40.739 334	28.32 189	53.577 335	31.36 200	14.739 409	42.65 117
30.7	10.40 110	45.67 —	41.067 328	30.12 180	53.907 330	29.73 163	15.148 409	41.48 56
Feb. 9.7	11.49 109	45.86 19	41.378 311	31.75 163	54.224 317	28.51 122	15.543 395	40.92 — 6
	102	86	291	144	295	78	372	
19.7	12.51	46.72	41.669	33.19	54.519	27.73	15.915	40.98
Mar. 1.6	13.44 93	48.20 148	41.934 265	34.38 119	54.786 267	27.40 33	16.251 336	41.63 65
11.6	14.24 80	50.23 203	42.169 235	35.32 94	55.022 236	27.51 11	16.545 294	42.83 120
21.6	14.88 64	52.72 249	42.371 202	36.00 68	55.223 201	28.01 50	16.792 247	44.52 169
31.6	15.35 47	55.54 282	42.542 171	36.45 45	55.389 166	28.88 87	16.988 196	46.62 210
	27	307	141	20	130	116	145	240
Apr. 10.5	15.62	58.61	42.683	36.65	55.519	30.04	17.133	49.02
20.5	15.72 —	61.79 318	42.791 108	36.66 —	55.615 96	31.42 138	17.226 93	51.64 262
30.5	15.62 10	64.96 317	42.871 80	36.49 17	55.678 63	32.96 154	17.270 44	54.36 272
May 10.5	15.36 26	68.01 305	42.923 52	36.18 31	55.710 32	34.60 164	17.266 4	57.07 271
20.4	14.94 42	70.84 283	42.948 25	35.76 42	55.714 4	36.23 163	17.220 46	59.68 261
	58	252	1	50	25	160	88	245
30.4	14.36	73.36	42.949	35.26	55.689	37.83	17.132	62.13
June 9.4	13.65 71	75.49 213	42.924 25	34.70 56	55.639 50	39.34 151	17.008 124	64.32 219
19.3	12.84 81	77.18 169	42.877 47	34.10 60	55.565 74	40.70 136	16.852 156	66.19 187
29.3	11.95 89	78.37 119	42.808 69	33.49 61	55.472 93	41.86 116	16.670 182	67.69 150
July 9.3	11.00 95	79.05 68	42.721 87	32.87 62	55.359 113	42.82 96	16.464 206	68.79 110
	99	14	104	60	128	71	222	67
19.3	10.01	79.19	42.617	32.27	55.231	43.53	16.242	69.46 22
29.2	9.00 101	78.78 41	42.500 117	31.70 57	55.092 139	43.99 46	16.009 233	69.68 —
Aug. 8.2	7.99 101	77.83 95	42.376 124	31.17 53	54.947 145	44.16 17	15.770 239	69.44 24
18.2	7.02 97	76.39 144	42.249 127	30.69 48	54.799 148	44.04 12	15.533 237	68.75 69
28.2	6.10 92	74.45 194	42.125 124	30.30 39	54.656 143	43.65 39	15.305 228	67.61 114
	84	238	113	28	131	69	209	157
Sept. 7.1	5.26	72.07	42.012	30.02	54.525	42.96	15.096	66.04
17.1	4.51 75	69.30 277	41.917 95	29.85 17	54.413 112	41.97 99	14.911 185	64.06 196
27.1	3.89 62	66.16 314	41.849 68	29.83 2	54.326 87	40.68 129	14.761 150	61.71 235
Oct. 7.0	3.38 51	62.73 343	41.813 36	30.01 18	54.272 54	39.10 158	14.654 107	59.02 269
17.0	3.03 35	59.09 364	41.817 4	30.38 37	54.259 13	37.25 185	14.597 57	56.03 299
	17	378	49	60	31	211	0	321
27.0	2.86	55.31	41.866	30.98	54.290	35.14	14.597	52.82
Nov. 6.0	2.86 0	51.47 384	41.963 97	31.82 84	54.369 79	32.81 233	14.657 60	49.43 339
15.9	3.05 19	47.66 381	42.108 145	32.92 110	54.498 129	30.29 252	14.781 124	45.95 348
25.9	3.41 36	43.98 368	42.301 193	34.24 132	54.677 179	27.65 264	14.969 188	42.47 348
Dec. 5.9	3.95 54	40.54 344	42.536 235	35.77 153	54.901 224	24.94 271	15.216 247	39.07 340
	71	309	273	172	264	270	300	321
15.9	4.66	37.45	42.809	37.49	55.165	22.24	15.516	35.86
25.8	5.51 85	34.79 266	43.111 302	39.32 183	55.460 295	19.64 260	15.861 345	32.95 291
35.8	6.48 97	32.65 214	43.432 321	41.23 191	55.778 318	17.20 244	16.240 379	30.42 253
Mean Place	9.051	74.88	39.592	17.81	52.501	50.39	13.805	68.27
Sec δ, Tan δ	4.782	+4.677	1.005	-0.098	1.062	+0.356	1.452	+1.052
D <sub>α</sub> α, D <sub>ω</sub> α	-0.01	+0.26	+0.06	-0.01	+0.06	+0.02	+0.05	+0.06
D <sub>δ</sub> δ, D <sub>ω</sub> δ	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5

**FOR THE UPPER TRANSIT AT WASHINGTON.**



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\phi$ Virginis. Mag. 5.0		$\delta$ Ursæ Minoris. Mag. 4.4		$\rho$ Boötis. Mag. 3.8		$\gamma$ Boötis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 23 s	° ' " - 1 51 "	h m 14 27 s	° ' " +76 3 "	h m 14 28 s	° ' " +30 43 "	h m 14 28 s	° ' " +38 39 "
Jan. 0.8	55.873	30.98	38.93	29.25	15.423	49.25	44.314	55.50
10.8	56.197 324	32.94 196	39.80 87	27.20 205	15.763 340	46.88 237	44.672 358	53.10 240
20.8	56.526 329	34.83 189	40.74 94	25.78 142	16.114 351	44.89 199	45.043 371	51.15 195
30.7	56.852 326	36.58 175	41.71 97	25.01 77	16.464 350	43.36 153	45.417 374	49.72 143
Feb. 9.7	57.165 313	38.12 154	42.67 96	24.91 10	16.805 341	42.34 102	45.781 364	48.85 87
	294	131	91	59	322	50	343	29
19.7	57.459	39.43	43.58	25.50	17.127	41.84	46.124	48.56
Mar. 1.7	57.728 269	40.47 104	44.43 85	26.73 123	17.422 295	41.88 4	46.440 316	48.84 28
11.6	57.970 242	41.22 75	45.18 75	28.54 181	17.685 263	42.43 55	46.723 283	49.67 83
21.6	58.181 211	41.70 48	45.80 62	30.84 230	17.912 227	43.45 102	46.965 242	50.99 132
31.6	58.362 181	41.90 20	46.27 47	33.55 271	18.103 191	44.86 141	47.165 200	52.74 175
	149	3	33	299	151	175	156	209
Apr. 10.6	58.511	41.87	46.60	36.54	18.254	46.61	47.321	54.83
20.5	58.629 118	41.61 26	46.77 17	39.70 316	18.366 112	48.60 199	47.434 113	57.16 233
30.5	58.719 90	41.18 43	46.76 1	42.90 320	18.441 75	50.77 217	47.505 71	59.64 248
May 10.5	58.780 61	40.62 56	46.61 15	46.04 314	18.480 39	53.00 223	47.534 29	62.17 253
20.4	58.812 32	39.95 67	46.32 29	49.00 296	18.486 6	55.22 222	47.525 9	64.66 249
	8	74	44	270	28	213	45	238
30.4	58.820	39.21	45.88	51.70	18.458	57.35	47.480	67.04
June 9.4	58.802 18	38.45 76	45.33 55	54.06 236	18.400 58	59.34 199	47.401 79	69.22 218
19.4	58.762 40	37.67 78	44.68 65	56.00 194	18.315 85	61.12 178	47.291 110	71.14 192
29.3	58.697 65	36.92 75	43.95 73	57.47 147	18.205 110	62.64 152	47.155 136	72.75 161
July 9.3	58.614 83	36.21 71	43.15 80	58.44 97	18.073 132	63.86 122	46.994 161	74.02 127
	102	67	85	44	150	90	179	88
19.3	58.512	35.54	42.30	58.88	17.923	64.76	46.815	74.90
29.3	58.395 117	34.95 59	41.43 87	58.79 9	17.758 165	65.30 54	46.621 194	75.39 49
Aug. 8.2	58.269 126	34.43 52	40.55 88	58.16 63	17.585 173	65.48 18	46.419 202	75.45 6
18.2	58.138 131	34.00 43	39.68 87	57.01 115	17.409 176	65.29 19	46.214 205	75.10 35
28.2	58.008 130	33.70 30	38.85 83	55.35 166	17.235 174	64.73 56	46.013 201	74.33 77
	120	16	77	212	163	93	189	119
Sept. 7.1	57.888 104	33.54 3	38.08	53.23	17.072	63.80	45.824	73.14
17.1	57.784 79	33.51 16	37.37 71	50.68 255	16.927 145	62.50 130	45.656 168	71.56 158
27.1	57.705 49	33.67 35	36.76 61	47.74 294	16.809 118	60.85 165	45.515 141	69.60 196
Oct. 7.1	57.656 10	34.02 56	36.26 50	44.49 325	16.724 85	58.87 198	45.412 103	67.30 230
17.0	57.646 34	34.58 80	35.90 23	40.97 371	16.680 44	56.60 227	45.353 59	64.68 262
					4	255	9	287
27.0	57.680	35.38	35.67	37.26	16.684	54.05	45.344	61.81
Nov. 6.0	57.763 83	36.41 103	35.60 7	33.45 381	16.739 55	51.28 277	45.391 47	58.71 310
16.0	57.893 130	37.69 128	35.69 9	29.62 383	16.847 108	48.34 294	45.495 104	55.48 323
25.9	58.071 178	39.17 148	35.94 25	25.88 374	17.009 162	45.30 304	45.657 162	52.18 330
Dec. 5.9	58.294 223	40.85 168	36.35 41	22.33 355	17.222 213	42.26 304	45.875 218	48.90 328
	261	183	58	326	259	299	267	316
15.9	58.555	42.68	36.93	19.07	17.481	39.27	46.142	45.74
25.8	58.846 291	44.60 192	37.62 69	16.21 286	17.777 296	36.45 282	46.450 308	42.80 294
35.8	59.160 314	46.55 195	38.43 81	13.83 238	18.101 324	33.89 256	46.792 342	40.18 262
Mean Place	55.458	23.14	40.979	54.14	15.208	66.73	44.200	74.90
Sec $\delta$ , Tan $\delta$	1.001	-0.032	4.151	+4.029	1.163	+0.594	1.281	+0.800
$D\phi\alpha$ , $D_\alpha\alpha$	+0.06	0.00	0.00	+0.22	+0.05	+0.03	+0.05	+0.04
$D\phi\delta$ , $D_\alpha\delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Apodis. Mag. 3.8		$\mu$ Virginis. Mag. 4.0		$\epsilon$ Boötis. Mag. 2.7		109 Virginis. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 37 s	° ' " -78 41 "	h m 14 38 s	° ' " - 5 17 "	h m 14 41 s	° ' " +27 24 "	h m 14 42 s	° ' " + 2 14 "
Jan. 0.8	27.24	27.21 40	41.395	59.48	21.891	68.35	3.397	22.19
10.8	28.55 131	26.81 —	41.717 322	61.33 185	22.218 327	65.93 242	3.713 316	20.18 201
20.8	29.91 136	26.98 17	42.047 330	63.15 182	22.558 340	63.87 206	4.038 325	18.27 191
30.8	31.28 137	27.71 73	42.375 328	64.87 172	22.901 343	62.23 164	4.362 324	16.55 172
Feb. 9.7	32.62 134	28.96 125	42.694 319	66.43 156	23.236 335	61.06 117	4.678 316	15.06 149
	128	173	301	136	320	66	298	120
19.7	33.90	30.69	42.995	67.79	23.556	60.40	4.976	13.86
Mar. 1.7	35.11 121	32.86 217	43.275 280	68.91 112	23.852 296	60.26 14	5.254 278	12.96 90
11.6	36.20 109	35.39 253	43.528 253	69.79 88	24.119 267	60.62 36	5.506 252	12.39 57
21.6	37.18 98	38.22 283	43.753 225	70.39 60	24.354 235	61.44 82	5.729 223	12.13 26
31.6	38.02 84	41.29 307	43.948 195	70.76 37	24.553 199	62.68 124	5.924 195	12.16 3
	69	323	165	12	163	158	163	31
Apr. 10.6	38.71	44.52	44.113	70.88	24.716	64.26	6.087	12.47
20.5	39.25 54	47.85 333	44.249 136	70.80 8	24.842 126	66.10 184	6.222 135	12.99 52
30.5	39.63 38	51.21 336	44.355 106	70.55 25	24.934 92	68.13 203	6.327 106	13.71 72
May 10.5	39.83 20	54.52 331	44.433 78	70.16 39	24.990 56	70.26 213	6.403 76	14.55 84
20.4	39.88 5	57.72 320	44.484 51	69.67 49	25.012 22	72.41 215	6.451 48	15.48 93
	12	300	22	58	10	209	20	98
30.4	39.76	60.72	44.506	69.09	25.002	74.50	6.471	16.46
June 9.4	39.46 30	63.48 276	44.503 3	68.47 62	24.963 39	76.47 197	6.465 6	17.46 100
19.4	39.03 43	65.91 243	44.472 31	67.82 65	24.895 68	78.27 180	6.432 33	18.43 97
29.3	38.46 57	67.96 205	44.418 54	67.17 65	24.801 94	79.83 156	6.376 56	19.35 92
July 9.3	37.76 70	69.57 161	44.340 78	66.53 64	24.682 119	81.11 128	6.295 81	20.19 84
	81	113	97	62	138	100	99	75
19.3	36.95	70.70	44.243	65.91	24.544	82.11	6.196	20.94
29.3	36.08 87	71.32 62	44.128 115	65.33 58	24.390 154	82.78 67	6.078 118	21.58 64
Aug. 8.2	35.16 92	71.40 8	44.001 127	64.80 53	24.223 167	83.10 32	5.949 129	22.10 52
18.2	34.23 93	70.92 48	43.867 134	64.34 46	24.052 171	83.08 2	5.812 137	22.48 38
28.2	33.33 90	69.92 100	43.732 135	63.96 38	23.881 171	82.70 38	5.674 138	22.70 22
	84	151	128	28	163	74	131	6
Sept. 7.1	32.49	68.41	43.604	63.68	23.718	81.96	5.543	22.76
17.1	31.76 73	66.43 198	43.492 112	63.52 16	23.570 148	80.87 109	5.426 117	22.64 12
27.1	31.15 61	64.08 235	43.401 91	63.51 1	23.447 123	79.44 143	5.330 96	22.31 33
Oct. 7.1	30.71 44	61.38 270	43.341 60	63.68 17	23.354 93	77.67 177	5.264 66	21.77 54
17.0	30.48 23	58.49 289	43.320 21	64.03 35	23.301 53	75.59 208	5.236 28	21.00 77
	3	299	22	56	8	235	14	99
27.0	30.45	55.50	43.342	64.59	23.293	73.24	5.250	20.01
Nov. 6.0	30.64 19	52.52 298	43.411 69	65.40 81	23.335 42	70.65 259	5.311 61	18.76 125
16.0	31.06 42	49.68 284	43.530 119	66.43 103	23.431 96	67.88 277	5.422 111	17.30 146
25.9	31.70 64	47.09 259	43.698 168	67.69 126	23.579 148	64.98 290	5.581 159	15.62 168
Dec. 5.9	32.55 85	44.84 225	43.912 214	69.15 146	23.777 198	62.03 295	5.785 204	13.78 184
	101	181	254	164	244	292	245	196
15.9	33.56	43.03	44.166	70.79	24.021	59.11	6.030	11.82
25.8	34.72 116	41.72 131	44.452 286	72.54 175	24.302 281	56.31 280	6.308 278	9.79 203
35.8	35.98 126	40.96 76	44.762 310	74.37 183	24.615 313	53.74 257	6.611 303	7.75 204
Mean Place	28.968	37.47	41.050	52.80	21.734	84.57	3.086	31.17
Sec $\delta$ , Tan $\delta$	5.102	-5.002	1.004	-0.093	1.127	+0.519	1.001	+0.039
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.14	-0.26	+0.06	0.00	+0.05	+0.03	+0.06	0.00
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	8 Libræ. Mag. 5.3		α Libræ. Mag. 2.9		Groombridge 2164. Mag. 5.7		β Ursæ Minoris. Mag. 2.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 46 s	° ' " -15 39 "	h m 14 46 s	° ' " -15 41 "	h m 14 49 s	° ' " +59 37 "	h m 14 50 s	° ' " +74 29 "
Jan. 0.8	5.873	13.55	17.320	54.70	19.213	28.90	53.71	17.20
10.8	6.204 <sup>331</sup>	15.08 <sup>153</sup>	17.651 <sup>331</sup>	56.23 <sup>153</sup>	19.670 <sup>457</sup>	26.40 <sup>250</sup>	54.46 <sup>75</sup>	14.88 <sup>232</sup>
20.8	6.545 <sup>341</sup>	16.68 <sup>160</sup>	17.992 <sup>341</sup>	57.83 <sup>160</sup>	20.161 <sup>491</sup>	24.45 <sup>195</sup>	55.28 <sup>82</sup>	13.13 <sup>175</sup>
30.8	6.886 <sup>341</sup>	18.30 <sup>162</sup>	18.332 <sup>340</sup>	59.45 <sup>162</sup>	20.668 <sup>507</sup>	23.13 <sup>132</sup>	56.14 <sup>86</sup>	12.02 <sup>111</sup>
Feb. 9.7	7.217 <sup>331</sup>	19.88 <sup>158</sup>	18.663 <sup>331</sup>	61.03 <sup>158</sup>	21.176 <sup>508</sup>	22.45 <sup>68</sup>	57.02 <sup>88</sup>	11.60 <sup>42</sup>
	315	149	315	149	490	0	85	26
19.7	7.532	21.37	18.978	62.52	21.666	22.45	57.87	11.86
Mar. 1.7	7.824 <sup>292</sup>	22.73 <sup>136</sup>	19.270 <sup>292</sup>	63.88 <sup>136</sup>	22.125 <sup>459</sup>	23.10 <sup>65</sup>	58.67 <sup>80</sup>	12.79 <sup>93</sup>
11.6	8.091 <sup>267</sup>	23.93 <sup>120</sup>	19.537 <sup>267</sup>	65.08 <sup>120</sup>	22.540 <sup>415</sup>	24.37 <sup>127</sup>	59.40 <sup>73</sup>	14.33 <sup>154</sup>
21.6	8.331 <sup>240</sup>	24.96 <sup>103</sup>	19.777 <sup>240</sup>	66.11 <sup>103</sup>	22.900 <sup>360</sup>	26.20 <sup>183</sup>	60.02 <sup>62</sup>	16.41 <sup>208</sup>
31.6	8.541 <sup>210</sup>	25.81 <sup>85</sup>	19.987 <sup>210</sup>	66.96 <sup>85</sup>	23.198 <sup>298</sup>	28.50 <sup>230</sup>	60.53 <sup>51</sup>	18.94 <sup>253</sup>
	181	67	182	66	229	267	37	287
Apr. 10.6	8.722	26.48	20.169	67.62	23.427	31.17	60.90	21.81
20.5	8.872 <sup>150</sup>	26.98 <sup>50</sup>	20.319 <sup>150</sup>	68.12 <sup>50</sup>	23.586 <sup>159</sup>	34.09 <sup>292</sup>	61.13 <sup>23</sup>	24.92 <sup>311</sup>
30.5	8.993 <sup>121</sup>	27.32 <sup>34</sup>	20.441 <sup>122</sup>	68.47 <sup>35</sup>	23.674 <sup>88</sup>	37.17 <sup>308</sup>	61.23 <sup>10</sup>	28.13 <sup>321</sup>
May 10.5	9.085 <sup>92</sup>	27.51 <sup>19</sup>	20.533 <sup>92</sup>	68.67 <sup>20</sup>	23.692 <sup>18</sup>	40.29 <sup>312</sup>	61.17 <sup>6</sup>	31.35 <sup>322</sup>
20.5	9.147 <sup>62</sup>	27.59 <sup>8</sup>	20.596 <sup>63</sup>	68.75 <sup>8</sup>	23.643 <sup>49</sup>	43.32 <sup>303</sup>	60.99 <sup>18</sup>	34.44 <sup>309</sup>
	33	2	33	2	112	287	31	289
30.4	9.180	27.57	20.629	68.73	23.531	46.19	60.68	37.33
June 9.4	9.186 <sup>6</sup>	27.45 <sup>12</sup>	20.635 <sup>6</sup>	68.61 <sup>12</sup>	23.360 <sup>171</sup>	48.79 <sup>260</sup>	60.25 <sup>43</sup>	39.92 <sup>259</sup>
19.4	9.162 <sup>24</sup>	27.23 <sup>22</sup>	20.612 <sup>23</sup>	68.40 <sup>21</sup>	23.136 <sup>224</sup>	51.09 <sup>230</sup>	59.72 <sup>53</sup>	42.14 <sup>222</sup>
29.3	9.113 <sup>49</sup>	26.95 <sup>28</sup>	20.563 <sup>49</sup>	68.12 <sup>28</sup>	22.867 <sup>269</sup>	52.99 <sup>190</sup>	59.09 <sup>63</sup>	43.93 <sup>179</sup>
July 9.3	9.038 <sup>75</sup>	26.59 <sup>36</sup>	20.488 <sup>75</sup>	67.77 <sup>35</sup>	22.558 <sup>309</sup>	54.44 <sup>145</sup>	58.41 <sup>68</sup>	45.24 <sup>131</sup>
	97	41	98	41	340	98	74	81
19.3	8.941	26.18	20.390	67.36	22.218	55.42	57.67	46.05
29.3	8.824 <sup>117</sup>	25.71 <sup>47</sup>	20.273 <sup>117</sup>	66.89 <sup>47</sup>	21.855 <sup>363</sup>	55.91 <sup>49</sup>	56.89 <sup>78</sup>	46.34 <sup>29</sup>
Aug. 8.2	8.693 <sup>131</sup>	25.19 <sup>52</sup>	20.142 <sup>131</sup>	66.37 <sup>52</sup>	21.478 <sup>377</sup>	55.88 <sup>3</sup>	56.09 <sup>80</sup>	46.09 <sup>25</sup>
18.2	8.554 <sup>139</sup>	24.64 <sup>55</sup>	20.002 <sup>140</sup>	65.81 <sup>56</sup>	21.097 <sup>381</sup>	55.35 <sup>53</sup>	55.29 <sup>80</sup>	45.30 <sup>79</sup>
28.2	8.412 <sup>142</sup>	24.07 <sup>57</sup>	19.860 <sup>142</sup>	65.24 <sup>57</sup>	20.721 <sup>376</sup>	54.31 <sup>104</sup>	54.50 <sup>79</sup>	44.01 <sup>129</sup>
	135	57	136	57	358	152	75	178
Sept. 7.2	8.277 <sup>120</sup>	23.50 <sup>54</sup>	19.724 <sup>120</sup>	64.67 <sup>55</sup>	20.363 <sup>331</sup>	52.79 <sup>199</sup>	53.75 <sup>69</sup>	42.23 <sup>225</sup>
17.1	8.157 <sup>99</sup>	22.96 <sup>48</sup>	19.604 <sup>99</sup>	64.12 <sup>48</sup>	20.032 <sup>291</sup>	50.80 <sup>242</sup>	53.06 <sup>60</sup>	39.98 <sup>266</sup>
27.1	8.058 <sup>66</sup>	22.48 <sup>37</sup>	19.505 <sup>66</sup>	63.64 <sup>38</sup>	19.741 <sup>241</sup>	48.38 <sup>279</sup>	52.46 <sup>53</sup>	37.32 <sup>303</sup>
Oct. 7.1	7.992 <sup>26</sup>	22.11 <sup>24</sup>	19.439 <sup>27</sup>	63.26 <sup>25</sup>	19.500 <sup>179</sup>	45.59 <sup>313</sup>	51.93 <sup>41</sup>	34.29 <sup>333</sup>
17.0	7.966 <sup>18</sup>	21.87 <sup>7</sup>	19.412 <sup>18</sup>	63.01 <sup>6</sup>	19.321 <sup>110</sup>	42.46 <sup>340</sup>	51.52 <sup>29</sup>	30.96 <sup>358</sup>
27.0	7.984	21.80	19.430	62.95	19.211 <sup>30</sup>	39.06 <sup>361</sup>	51.23 <sup>15</sup>	27.38 <sup>374</sup>
Nov. 6.0	8.051 <sup>67</sup>	21.94 <sup>14</sup>	19.498 <sup>68</sup>	63.09 <sup>14</sup>	19.181 <sup>53</sup>	35.45 <sup>372</sup>	51.08 <sup>0</sup>	23.64 <sup>381</sup>
16.0	8.170 <sup>119</sup>	22.30 <sup>61</sup>	19.617 <sup>119</sup>	63.44 <sup>61</sup>	19.234 <sup>137</sup>	31.73 <sup>375</sup>	51.08 <sup>15</sup>	19.83 <sup>378</sup>
25.9	8.340 <sup>218</sup>	22.91 <sup>85</sup>	19.787 <sup>218</sup>	64.05 <sup>85</sup>	19.371 <sup>220</sup>	27.98 <sup>367</sup>	51.23 <sup>31</sup>	16.05 <sup>367</sup>
Dec. 5.9	8.558 <sup>260</sup>	23.76 <sup>108</sup>	20.005 <sup>260</sup>	64.90 <sup>108</sup>	19.591 <sup>298</sup>	24.31 <sup>347</sup>	51.54 <sup>44</sup>	12.38 <sup>342</sup>
15.9	8.818	24.84	20.265	65.98	19.889	20.84	51.98	8.96
25.9	9.112 <sup>294</sup>	26.11 <sup>127</sup>	20.559 <sup>294</sup>	67.25 <sup>127</sup>	20.256 <sup>367</sup>	17.67 <sup>317</sup>	52.55 <sup>57</sup>	5.88 <sup>308</sup>
35.8	9.430 <sup>318</sup>	27.55 <sup>144</sup>	20.877 <sup>318</sup>	68.68 <sup>143</sup>	20.683 <sup>427</sup>	14.89 <sup>278</sup>	53.24 <sup>69</sup>	3.25 <sup>263</sup>
Mean Place	5.561	10.04	17.008	51.20	19.924	51.22	56.060	40.81
Sec δ, Tan δ	1.039	-0.280	1.039	-0.281	1.978	+1.706	3.740	+3.603
Dψ α, Dω α	+0.07	-0.01	+0.07	-0.01	+0.03	+0.08	0.00	+0.18
Dψ δ, Dω δ	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi^2$ Libræ. Mag. 5.6			Piazzi 221. Mag. 5.8			$\beta$ Lupi. Mag. 2.8			$\delta$ Libræ. Var. 4.8–6.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	14	52	–11 4	14	52	+14 46	14	53	–42 47	14	56	– 8 11
	s		"	s		"	s		"	s		"
Jan. 0.8	15.964		36.40	18.289		39.34	5.324		58.27	32.355		30.86
10.8	16.287	323	38.03 163	18.600	311	37.06 228	5.739	415	58.84 57	32.672	317	32.56 170
20.8	16.620	333	39.69 166	18.924	324	35.03 203	6.167	428	59.73 89	33.001	329	34.24 168
30.8	16.954	334	41.31 162	19.250	326	33.30 173	6.596	429	60.92 119	33.332	331	35.88 164
Feb. 9.7	17.280	326	42.85 154	19.570	320	31.91 139	7.016	420	62.36 144	33.655	323	37.40 152
		311	140		305	97		401	165		308	135
19.7	17.591		44.25	19.875		30.94	7.417		64.01	33.963		38.75
Mar. 1.7	17.882	291	45.47 122	20.161	286	30.40 54	7.794	377	65.81 180	34.253	290	39.88 113
11.7	18.147	265	46.50 103	20.421	260	30.27 13	8.141	347	67.71 190	34.518	265	40.80 92
21.6	18.387	240	47.32 82	20.654	233	30.55 28	8.455	314	69.68 197	34.759	241	41.48 68
31.6	18.598	211	47.91 59	20.856	202	31.20 65	8.734	279	71.67 199	34.971	212	41.93 45
		182	40		170	96		240	198		183	22
Apr. 10.6	18.780		48.31	21.026		32.16	8.974		73.65	35.154		42.15
20.5	18.932	152	48.52 21	21.167	141	33.39 123	9.177	203	75.58 193	35.308	154	42.19 4
30.5	19.056	124	48.57 5	21.275	108	34.81 142	9.341	164	77.44 186	35.433	125	42.06 13
May 10.5	19.151	95	48.48 9	21.352	77	36.36 155	9.466	125	79.20 176	35.530	97	41.78 28
20.5	19.217	66	48.27 21	21.400	48	37.98 162	9.550	84	80.83 163	35.598	68	41.40 38
		38	29		17	163		45	148		41	46
30.4	19.255		47.98	21.417		39.61	9.595		82.31	35.639		40.94
June 9.4	19.263	8	47.61 37	21.406	11	41.18 157	9.599	4	83.61 130	35.650	11	40.42 52
19.4	19.244	19	47.19 42	21.368	38	42.65 147	9.563	36	84.70 109	35.633	17	39.86 56
29.4	19.199	45	46.73 46	21.303	65	43.99 134	9.489	74	85.56 86	35.590	43	39.28 58
July 9.3	19.128	71	46.23 50	21.214	89	45.15 116	9.380	109	86.14 58	35.520	70	38.70 58
		93	51		111	96		141	31		92	58
19.3	19.035		45.72	21.103		46.11	9.239		86.45	35.428		38.12
29.3	18.921	114	45.20 52	20.975	128	46.85 74	9.071	168	86.48 3	35.315	113	37.57 55
Aug. 8.2	18.793	128	44.68 52	20.834	141	47.35 50	8.884	187	86.21 27	35.188	127	37.04 53
18.2	18.656	137	44.16 52	20.684	150	47.59 24	8.686	198	85.64 57	35.051	137	36.55 49
28.2	18.516	140	43.68 48	20.532	152	47.58 1	8.485	201	84.79 85	34.910	141	36.12 43
		136	44		147	29		193	111		136	36
Sept. 7.2	18.380		43.24	20.385		47.29	8.292		83.68	34.774		35.76
17.1	18.258	122	42.87 37	20.250	135	46.71 58	8.119	173	82.36 132	34.650	124	35.50 26
27.1	18.156	102	42.60 27	20.138	112	45.88 83	7.976	143	80.88 148	34.545	105	35.35 15
Oct. 7.1	18.086	70	42.45 15	20.054	84	44.74 114	7.877	99	79.28 160	34.471	74	35.34 1
17.1	18.053	33	42.46 1	20.005	49	43.34 140	7.830	47	77.64 164	34.434	37	35.52 18
		11	20		5	168		11	160		5	35
27.0	18.064		42.66	20.000		41.66	7.841		76.04	34.439		35.87
Nov. 6.0	18.123	59	43.06 40	20.042	42	39.74 192	7.916	75	74.56 148	34.492	53	36.44 57
16.0	18.232	109	43.69 63	20.133	91	37.59 215	8.059	143	73.26 130	34.595	103	37.24 80
25.9	18.392	160	44.55 86	20.276	143	35.28 231	8.267	208	72.22 104	34.748	153	38.26 102
Dec. 5.9	18.600	208	45.64 109	20.464	188	32.85 243	8.535	268	71.48 74	34.948	200	39.49 123
		249	128		233	249		322	40		243	141
15.9	18.849		46.92	20.697		30.36	8.857		71.08	35.191		40.90
25.9	19.131	282	48.36 144	20.966	269	27.89 247	9.222	365	71.04 4	35.468	277	42.46 156
35.8	19.440	309	49.94 158	21.262	296	25.53 236	9.620	396	71.36 32	35.771	303	44.12 166
Mean Place	15.680		31.52	18.093		51.83	5.179		62.05	32.093		25.13
Sec $\delta$ , Tan $\delta$	1.019		–0.196	1.034		+0.264	1.363		–0.926	1.010		–0.144
$D_{\mu} a, D_{\omega} a$	+0.07		–0.01	+0.06		+0.01	+0.08		–0.04	+0.06		–0.01
$D_{\mu} \delta, D_{\omega} \delta$	–0.3		–0.7	–0.3		–0.7	–0.3		–0.7	–0.3		–0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Boötis. Mag. 3.6		$\gamma$ Scorpii. Mag. 3.4		$\psi$ Boötis. Mag. 4.7		$\epsilon$ Boötis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 58 s	° ' +40 42 "	h m 14 59 s	° ' -24 57 "	h m 15 0 s	° ' +27 15 "	h m 15 3 s	° ' +25 11 "
Jan. 0.8	49.013	43.79	12.748	24.11	53.365	58.68	39.364	15.17
10.8	49.358 <sup>345</sup>	41.18 <sup>261</sup>	13.094 <sup>346</sup>	25.26 <sup>115</sup>	53.681 <sup>316</sup>	56.19 <sup>249</sup>	39.676 <sup>312</sup>	12.70 <sup>247</sup>
20.8	49.723 <sup>365</sup>	39.01 <sup>217</sup>	13.451 <sup>357</sup>	26.56 <sup>130</sup>	54.013 <sup>332</sup>	54.03 <sup>216</sup>	40.005 <sup>329</sup>	10.54 <sup>216</sup>
30.8	50.098 <sup>375</sup>	37.35 <sup>166</sup>	13.809 <sup>358</sup>	27.98 <sup>142</sup>	54.351 <sup>338</sup>	52.29 <sup>174</sup>	40.341 <sup>336</sup>	8.77 <sup>177</sup>
Feb. 9.7	50.471 <sup>373</sup>	36.26 <sup>109</sup>	14.160 <sup>351</sup>	29.46 <sup>148</sup>	54.687 <sup>336</sup>	51.01 <sup>128</sup>	40.673 <sup>332</sup>	7.45 <sup>132</sup>
	361	49	337	150	324	77	321	83
19.7	50.832	35.77	14.497	30.96	55.011	50.24	40.994	6.62
Mar. 1.7	51.171 <sup>339</sup>	35.88 <sup>11</sup>	14.814 <sup>317</sup>	32.44 <sup>148</sup>	55.314 <sup>303</sup>	49.99 <sup>25</sup>	41.296 <sup>302</sup>	6.30 <sup>32</sup>
11.7	51.480 <sup>309</sup>	36.56 <sup>68</sup>	15.105 <sup>291</sup>	33.85 <sup>141</sup>	55.593 <sup>279</sup>	50.26 <sup>27</sup>	41.574 <sup>278</sup>	6.48 <sup>18</sup>
21.6	51.754 <sup>274</sup>	37.78 <sup>122</sup>	15.369 <sup>284</sup>	35.17 <sup>182</sup>	55.841 <sup>248</sup>	51.00 <sup>74</sup>	41.823 <sup>249</sup>	7.14 <sup>66</sup>
31.6	51.990 <sup>236</sup>	39.48 <sup>170</sup>	15.606 <sup>237</sup>	36.38 <sup>121</sup>	56.057 <sup>216</sup>	52.18 <sup>118</sup>	42.040 <sup>217</sup>	8.22 <sup>108</sup>
	192	209	205	110	183	155	185	143
Apr. 10.6	52.182	41.57	15.811	37.48	56.240	53.73	42.225	9.65
20.5	52.332 <sup>150</sup>	43.94 <sup>237</sup>	15.986 <sup>175</sup>	38.44 <sup>96</sup>	56.386 <sup>146</sup>	55.56 <sup>183</sup>	42.375 <sup>150</sup>	11.39 <sup>174</sup>
30.5	52.438 <sup>106</sup>	46.52 <sup>258</sup>	16.130 <sup>144</sup>	39.30 <sup>86</sup>	56.437 <sup>111</sup>	57.61 <sup>205</sup>	42.490 <sup>115</sup>	13.34 <sup>193</sup>
May 10.5	52.501 <sup>63</sup>	49.20 <sup>268</sup>	16.243 <sup>113</sup>	40.02 <sup>72</sup>	56.574 <sup>77</sup>	59.78 <sup>217</sup>	42.571 <sup>81</sup>	15.43 <sup>209</sup>
20.5	52.521 <sup>20</sup>	51.88 <sup>268</sup>	16.324 <sup>81</sup>	40.63 <sup>61</sup>	56.617 <sup>43</sup>	61.99 <sup>221</sup>	42.620 <sup>49</sup>	17.56 <sup>213</sup>
	19	259	51	48	9	218	15	209
30.4	52.502	54.47	16.375	41.11	56.626	64.17	42.635	19.65
June 9.4	52.444 <sup>58</sup>	56.91 <sup>244</sup>	16.392 <sup>17</sup>	41.48 <sup>37</sup>	56.602 <sup>24</sup>	66.24 <sup>207</sup>	42.618 <sup>17</sup>	21.67 <sup>202</sup>
19.4	52.350 <sup>94</sup>	59.10 <sup>219</sup>	16.378 <sup>14</sup>	41.71 <sup>23</sup>	56.548 <sup>54</sup>	68.16 <sup>192</sup>	42.571 <sup>47</sup>	23.55 <sup>188</sup>
29.4	52.223 <sup>127</sup>	61.01 <sup>191</sup>	16.334 <sup>44</sup>	41.83 <sup>12</sup>	56.465 <sup>83</sup>	69.85 <sup>169</sup>	42.495 <sup>76</sup>	25.21 <sup>166</sup>
July 9.3	52.066 <sup>157</sup>	62.57 <sup>156</sup>	16.260 <sup>74</sup>	41.82 <sup>1</sup>	56.355 <sup>110</sup>	71.29 <sup>144</sup>	42.393 <sup>102</sup>	26.63 <sup>142</sup>
	181	118	100	15	133	114	127	114
19.3	51.885	63.75	16.160	41.67	56.222	72.43	42.266	27.77
29.3	51.683 <sup>202</sup>	64.52 <sup>77</sup>	16.036 <sup>124</sup>	41.37 <sup>30</sup>	56.069 <sup>153</sup>	73.25 <sup>82</sup>	42.120 <sup>146</sup>	28.60 <sup>83</sup>
Aug. 8.2	51.465 <sup>218</sup>	64.86 <sup>34</sup>	15.896 <sup>140</sup>	40.95 <sup>42</sup>	55.901 <sup>168</sup>	73.74 <sup>49</sup>	41.958 <sup>162</sup>	29.12 <sup>52</sup>
18.2	51.239 <sup>226</sup>	64.77 <sup>9</sup>	15.745 <sup>151</sup>	40.40 <sup>55</sup>	55.724 <sup>177</sup>	73.87 <sup>13</sup>	41.787 <sup>171</sup>	29.29 <sup>17</sup>
28.2	51.013 <sup>226</sup>	64.24 <sup>53</sup>	15.589 <sup>156</sup>	39.75 <sup>65</sup>	55.545 <sup>179</sup>	73.63 <sup>24</sup>	41.613 <sup>174</sup>	29.11 <sup>18</sup>
	219	97	152	76	175	59	171	51
Sept. 7.2	50.794	63.27	15.437	39.00	55.370	73.04	41.442	28.60
17.1	50.591 <sup>203</sup>	61.89 <sup>138</sup>	15.299 <sup>138</sup>	38.19 <sup>81</sup>	55.208 <sup>162</sup>	72.09 <sup>95</sup>	41.285 <sup>157</sup>	27.72 <sup>88</sup>
27.1	50.413 <sup>178</sup>	60.09 <sup>180</sup>	15.186 <sup>113</sup>	37.36 <sup>83</sup>	55.067 <sup>141</sup>	70.78 <sup>131</sup>	41.147 <sup>138</sup>	26.50 <sup>122</sup>
Oct. 7.1	50.268 <sup>145</sup>	57.91 <sup>218</sup>	15.104 <sup>82</sup>	36.55 <sup>81</sup>	54.956 <sup>111</sup>	69.13 <sup>165</sup>	41.038 <sup>109</sup>	24.94 <sup>156</sup>
17.1	50.166 <sup>102</sup>	55.38 <sup>253</sup>	15.064 <sup>40</sup>	35.82 <sup>73</sup>	54.883 <sup>73</sup>	67.15 <sup>198</sup>	40.966 <sup>72</sup>	23.08 <sup>186</sup>
	52	283	7	63	29	226	29	217
27.0	50.114	52.55	15.071	35.19	54.854	64.89	40.937	20.91
Nov. 6.0	50.118 <sup>4</sup>	49.47 <sup>308</sup>	15.130 <sup>59</sup>	34.73 <sup>46</sup>	54.874 <sup>20</sup>	62.37 <sup>252</sup>	40.957 <sup>20</sup>	18.50 <sup>241</sup>
16.0	50.180 <sup>62</sup>	46.22 <sup>325</sup>	15.244 <sup>114</sup>	34.48 <sup>25</sup>	54.946 <sup>72</sup>	59.64 <sup>273</sup>	41.029 <sup>72</sup>	15.86 <sup>264</sup>
25.9	50.303 <sup>123</sup>	42.86 <sup>336</sup>	15.413 <sup>169</sup>	34.47 <sup>1</sup>	55.072 <sup>126</sup>	56.76 <sup>288</sup>	41.153 <sup>124</sup>	13.07 <sup>279</sup>
Dec. 5.9	50.485 <sup>182</sup>	39.48 <sup>338</sup>	15.633 <sup>220</sup>	34.72 <sup>25</sup>	55.250 <sup>178</sup>	53.82 <sup>294</sup>	41.328 <sup>175</sup>	10.20 <sup>287</sup>
	237	330	265	51	225	294	223	287
15.9	50.722	36.18	15.898	35.23	55.475	50.88	41.551	7.33
25.9	51.006 <sup>284</sup>	33.08 <sup>310</sup>	16.200 <sup>302</sup>	36.00 <sup>77</sup>	55.741 <sup>266</sup>	48.03 <sup>285</sup>	41.814 <sup>263</sup>	4.54 <sup>279</sup>
35.8	51.329 <sup>323</sup>	30.26 <sup>282</sup>	16.530 <sup>330</sup>	36.99 <sup>99</sup>	56.039 <sup>298</sup>	45.39 <sup>264</sup>	42.109 <sup>295</sup>	1.93 <sup>261</sup>
Mean Place	49.182	62.45	12.512	23.19	53.334	74.23	39.326	30.10
Sec $\delta$ , Tan $\delta$	1.319	+0.860	1.103	-0.465	1.125	+0.515	1.105	+0.470
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.05	+0.04	+0.07	-0.02	+0.05	+0.02	+0.05	+0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

### APPARENT PLACES OF STARS, 1917.

**FOR THE UPPER TRANSIT AT WASHINGTON.**

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Boötis. Mag. 3.5		$\beta$ Libræ. Mag. 2.7		$\gamma$ Ursæ Minoris. Mag. 3.1		$\mu$ Boötis <i>pr.</i> Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 12 s	° ' +33 36 "	h m 15 12 s	° ' - 9 4 "	h m 15 20 s	° ' +72 7 "	h m 15 21 s	° ' +37 39 "
Jan. 0.9	9.271	69.02	32.483	44.12	48.51	23.92	21.019	46.52
10.8	9.590 <sup>319</sup>	66.39 <sup>263</sup>	32.795 <sup>312</sup>	45.73 <sup>161</sup>	49.12 <sup>61</sup>	21.26 <sup>266</sup>	21.339 <sup>320</sup>	43.82 <sup>270</sup>
20.8	9.929 <sup>339</sup>	64.14 <sup>225</sup>	33.120 <sup>325</sup>	47.34 <sup>161</sup>	49.80 <sup>68</sup>	19.13 <sup>213</sup>	21.684 <sup>345</sup>	41.50 <sup>232</sup>
30.8	10.279 <sup>350</sup>	62.35 <sup>179</sup>	33.449 <sup>329</sup>	48.91 <sup>157</sup>	50.54 <sup>74</sup>	17.62 <sup>151</sup>	22.041 <sup>357</sup>	39.66 <sup>184</sup>
Feb. 9.7	10.629 <sup>350</sup>	61.07 <sup>128</sup>	33.774 <sup>325</sup>	50.37 <sup>146</sup>	51.31 <sup>77</sup>	16.77 <sup>85</sup>	22.401 <sup>360</sup>	38.36 <sup>130</sup>
	340	73	314	130	76	17	352	73
19.7	10.969	60.34	34.088	51.67	52.07	16.60	22.753	37.63
Mar. 1.7	11.292 <sup>323</sup>	60.17 <sup>17</sup>	34.384 <sup>296</sup>	52.77 <sup>110</sup>	52.81 <sup>74</sup>	17.12 <sup>52</sup>	23.090 <sup>337</sup>	37.49 <sup>14</sup>
11.7	11.589 <sup>297</sup>	60.56 <sup>39</sup>	34.659 <sup>275</sup>	53.66 <sup>89</sup>	53.49 <sup>68</sup>	18.28 <sup>116</sup>	23.402 <sup>312</sup>	37.95 <sup>46</sup>
21.6	11.857 <sup>268</sup>	61.48 <sup>92</sup>	34.910 <sup>251</sup>	54.32 <sup>66</sup>	54.10 <sup>61</sup>	20.03 <sup>175</sup>	23.686 <sup>284</sup>	38.94 <sup>99</sup>
31.6	12.092 <sup>235</sup>	62.86 <sup>138</sup>	35.136 <sup>226</sup>	54.76 <sup>44</sup>	54.62 <sup>52</sup>	22.30 <sup>227</sup>	23.935 <sup>249</sup>	40.43 <sup>149</sup>
	198	178	198	22	41	268	212	190
Apr. 10.6	12.290	64.64	35.334	54.98	55.03	24.98	24.147	42.33
20.6	12.451 <sup>161</sup>	66.74 <sup>210</sup>	35.504 <sup>170</sup>	55.02 <sup>4</sup>	55.33 <sup>30</sup>	27.98 <sup>300</sup>	24.320 <sup>173</sup>	44.57 <sup>224</sup>
30.5	12.574 <sup>123</sup>	69.05 <sup>231</sup>	35.646 <sup>142</sup>	54.90 <sup>12</sup>	55.51 <sup>18</sup>	31.16 <sup>318</sup>	24.452 <sup>132</sup>	47.04 <sup>247</sup>
May 10.5	12.658 <sup>84</sup>	71.50 <sup>245</sup>	35.759 <sup>113</sup>	54.63 <sup>27</sup>	55.56 <sup>5</sup>	34.42 <sup>326</sup>	24.545 <sup>93</sup>	49.67 <sup>263</sup>
20.5	12.706 <sup>48</sup>	73.99 <sup>249</sup>	35.843 <sup>84</sup>	54.26 <sup>37</sup>	55.50 <sup>6</sup>	37.65 <sup>323</sup>	24.596 <sup>51</sup>	52.33 <sup>266</sup>
	9	245	56	44	18	309	12	262
30.4	12.715	76.44	35.899	53.82	55.32	40.74	24.608	54.95
June 9.4	12.689 <sup>26</sup>	78.78 <sup>234</sup>	35.924 <sup>25</sup>	53.32 <sup>50</sup>	55.04 <sup>28</sup>	43.61 <sup>287</sup>	24.580 <sup>28</sup>	57.46 <sup>251</sup>
19.4	12.629 <sup>60</sup>	80.93 <sup>215</sup>	35.920 <sup>4</sup>	52.78 <sup>54</sup>	54.65 <sup>39</sup>	46.16 <sup>255</sup>	24.515 <sup>65</sup>	59.78 <sup>232</sup>
29.4	12.537 <sup>92</sup>	82.84 <sup>191</sup>	35.886 <sup>34</sup>	52.23 <sup>55</sup>	54.18 <sup>47</sup>	48.33 <sup>217</sup>	24.416 <sup>99</sup>	61.83 <sup>206</sup>
July 9.3	12.414 <sup>123</sup>	84.45 <sup>161</sup>	35.825 <sup>61</sup>	51.67 <sup>56</sup>	53.62 <sup>56</sup>	50.07 <sup>174</sup>	24.284 <sup>132</sup>	63.58 <sup>175</sup>
	147	127	86	56	61	127	161	141
19.3	12.267	85.72	35.739	51.11	53.01	51.34	24.123	64.99
29.3	12.096 <sup>171</sup>	86.65 <sup>93</sup>	35.630 <sup>109</sup>	50.57 <sup>54</sup>	52.35 <sup>66</sup>	52.09 <sup>75</sup>	23.939 <sup>184</sup>	66.00 <sup>101</sup>
Aug. 8.3	11.909 <sup>187</sup>	87.19 <sup>54</sup>	35.503 <sup>127</sup>	50.06 <sup>51</sup>	51.66 <sup>69</sup>	52.33 <sup>24</sup>	23.736 <sup>203</sup>	66.61 <sup>61</sup>
18.2	11.711 <sup>198</sup>	87.33 <sup>14</sup>	35.364 <sup>139</sup>	49.58 <sup>48</sup>	50.95 <sup>71</sup>	52.04 <sup>29</sup>	23.519 <sup>217</sup>	66.79 <sup>18</sup>
28.2	11.509 <sup>202</sup>	87.07 <sup>26</sup>	35.218 <sup>146</sup>	49.14 <sup>44</sup>	50.24 <sup>71</sup>	51.23 <sup>81</sup>	23.297 <sup>222</sup>	66.55 <sup>24</sup>
	199	67	144	37	69	133	220	67
Sept. 7.2	11.310	86.40	35.074	48.77	49.55	49.90	23.077	65.88
17.1	11.122 <sup>188</sup>	85.33 <sup>107</sup>	34.940 <sup>134</sup>	48.48 <sup>29</sup>	48.90 <sup>65</sup>	48.08 <sup>182</sup>	22.870 <sup>207</sup>	64.78 <sup>110</sup>
27.1	10.957 <sup>165</sup>	83.87 <sup>146</sup>	34.826 <sup>114</sup>	48.31 <sup>17</sup>	48.30 <sup>60</sup>	45.81 <sup>227</sup>	22.682 <sup>188</sup>	63.28 <sup>150</sup>
Oct. 7.1	10.821 <sup>136</sup>	82.05 <sup>182</sup>	34.738 <sup>88</sup>	48.25 <sup>6</sup>	47.78 <sup>52</sup>	43.13 <sup>268</sup>	22.524 <sup>158</sup>	61.39 <sup>189</sup>
17.1	10.723 <sup>98</sup>	79.87 <sup>218</sup>	34.686 <sup>52</sup>	48.35 <sup>10</sup>	47.34 <sup>44</sup>	40.08 <sup>305</sup>	22.405 <sup>119</sup>	59.12 <sup>227</sup>
	53	250	9	30	34	335	73	259
27.0	10.670	77.37	34.677	48.65	47.00	36.73	22.332	56.53
Nov. 6.0	10.670 <sup>0</sup>	74.62 <sup>275</sup>	34.715 <sup>38</sup>	49.13 <sup>48</sup>	46.78 <sup>22</sup>	33.14 <sup>359</sup>	22.311 <sup>21</sup>	53.67 <sup>286</sup>
16.0	10.723 <sup>53</sup>	71.64 <sup>298</sup>	34.803 <sup>88</sup>	49.83 <sup>70</sup>	46.69 <sup>9</sup>	29.41 <sup>373</sup>	22.347 <sup>36</sup>	50.58 <sup>309</sup>
26.0	10.833 <sup>110</sup>	68.53 <sup>311</sup>	34.941 <sup>138</sup>	50.75 <sup>92</sup>	46.74 <sup>5</sup>	25.63 <sup>378</sup>	22.443 <sup>96</sup>	47.35 <sup>323</sup>
Dec. 5.9	10.998 <sup>165</sup>	65.36 <sup>317</sup>	35.128 <sup>187</sup>	51.88 <sup>113</sup>	46.91 <sup>17</sup>	21.89 <sup>374</sup>	22.596 <sup>153</sup>	44.06 <sup>329</sup>
	216	315	231	130	31	358	208	327
15.9	11.214	62.21	35.359	53.18	47.22	18.31	22.804	40.79
25.9	11.476 <sup>262</sup>	59.20 <sup>301</sup>	35.626 <sup>267</sup>	54.64 <sup>146</sup>	47.67 <sup>45</sup>	14.99 <sup>332</sup>	23.060 <sup>256</sup>	37.66 <sup>313</sup>
35.8	11.775 <sup>299</sup>	56.40 <sup>280</sup>	35.922 <sup>296</sup>	56.19 <sup>155</sup>	48.21 <sup>54</sup>	12.07 <sup>292</sup>	23.357 <sup>297</sup>	34.78 <sup>288</sup>
Mean Place	9.406	85.59	32.293	38.73	51.060	45.49	21.295	63.51
Sec $\delta$ , Tan $\delta$	1.201	+0.665	1.013	-0.160	3.258	+3.101	1.263	+0.772
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.05	+0.03	+0.06	-0.01	0.00	+0.13	+0.05	+0.03
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.8	-0.3	-0.8





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^1$ Boötis. Mag. 5.2		$\gamma$ Lupi (mean). Mag. 3.0		$\gamma$ Libræ. Mag. 4.0		$\alpha$ Coronæ Borealis. Mag. 2.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 27 s	° ' " +41 6 "	h m 15 29 s	° ' " -40 53 "	h m 15 30 s	° ' " -14 30 "	h m 15 31 s	° ' " +26 59 "
Jan. 0.9	56.477	38.05	36.230	17.53	52.973	52.20	10.242	21.53
10.8	56.800 323	35.26 279	36.615 385	17.78 25	53.284 311	53.51 131	10.539 297	18.94 259
20.8	57.151 351	32.89 237	37.022 407	18.32 54	53.609 325	54.89 138	10.857 318	16.66 228
30.8	57.517 366	31.02 187	37.437 415	19.13 81	53.942 333	56.27 138	11.188 331	14.75 191
Feb. 9.8	57.889 372	29.69 138	37.851 414	20.17 104	54.275 333	57.61 134	11.521 333	13.31 144
	366	74	404	124	324	125	327	93
19.7	58.255	28.95	38.255	21.41	54.599	58.86	11.848	12.38
Mar. 1.7	58.605 350	28.83 12	38.643 388	22.79 138	54.907 308	59.96 110	12.162 314	11.96 42
11.7	58.934 329	29.32 49	39.009 366	24.28 149	55.199 292	60.92 96	12.455 293	12.07 11
21.7	59.232 298	30.36 104	39.347 338	25.84 156	55.469 270	61.70 78	12.724 269	12.68 61
31.6	59.496 264	31.92 156	39.656 309	27.45 161	55.713 244	62.30 60	12.965 241	13.75 107
	225	200	278	163	219	43	210	147
Apr. 10.6	59.721	33.92	39.934	29.08	55.932	62.73	13.175	15.22
20.6	59.906 185	36.25 233	40.177 243	30.70 162	56.126 194	62.99 26	13.353 178	17.02 180
30.5	60.047 141	38.84 259	40.385 208	32.28 158	56.290 164	63.11 12	13.497 144	19.07 206
May 10.5	60.145 98	41.58 274	40.555 170	33.81 153	56.427 137	63.12 1	13.606 109	21.28 221
20.5	60.200 55	44.37 279	40.686 131	35.27 146	56.533 106	63.03 9	13.680 74	23.57 229
	12	276	91	136	76	19	39	230
30.5	60.212	47.13	40.777	36.63	56.609	62.84	13.719	25.87
June 9.4	60.183 29	49.76 263	40.826 49	37.87 124	56.654 45	62.60 24	13.724 5	28.10 223
19.4	60.113 70	52.19 243	40.832 6	38.95 108	56.666 12	62.32 28	13.695 29	30.18 208
29.4	60.006 107	54.35 216	40.797 35	39.86 91	56.647 19	61.99 33	13.633 62	32.07 157
July 9.4	59.865 141	56.21 186	40.722 75	40.56 70	56.598 49	61.62 37	13.541 92	33.72 165
	173	148	112	50	79	39	121	138
19.3	59.692	57.69	40.610	41.06	56.519	61.23	13.420	35.10
29.3	59.493 199	58.77 108	40.465 145	41.31 25	56.416 103	60.82 41	13.275 145	36.16 106
Aug. 8.3	59.274 219	59.42 65	40.292 173	41.29 2	56.289 127	60.38 44	13.109 166	36.88 72
18.2	59.041 233	59.64 22	40.101 191	41.00 29	56.147 142	59.93 45	12.929 180	37.25 37
28.2	58.801 240	59.41 23	39.899 202	40.46 54	55.996 151	59.48 45	12.742 187	37.26 1
	239	68	202	80	152	45	188	36
Sept. 7.2	58.562	58.73	39.697	39.66	55.844	59.03	12.554	36.90
17.2	58.335 227	57.61 112	39.507 190	38.65 101	55.699 145	58.61 42	12.374 180	36.17 73
27.1	58.129 206	56.06 155	39.340 167	37.43 122	55.572 127	58.24 37	12.212 162	35.07 110
Oct. 7.1	57.952 177	54.10 196	39.208 132	36.08 135	55.470 102	57.94 30	12.075 137	33.63 144
17.1	57.814 138	51.77 233	39.122 86	34.64 144	55.403 67	57.77 17	11.973 102	31.83 180
	90	267	32	145	25	4	61	211
27.1	57.724	49.10	39.090	33.19	55.378	57.73	11.912	29.72
Nov. 6.0	57.688 36	46.14 296	39.120 30	31.79 140	55.401 23	57.85 12	11.899 13	27.33 239
16.0	57.710 22	42.96 318	39.214 94	30.52 127	55.475 74	58.17 32	11.939 40	24.69 264
26.0	57.794 84	39.63 333	39.372 158	29.43 109	55.601 126	58.69 52	12.032 93	21.89 280
Dec. 5.9	57.939 145	36.24 339	39.593 221	28.57 86	55.776 175	59.43 74	12.178 146	18.98 291
	202	336	277	58	222	92	195	295
15.9	58.141	32.88	39.870	27.99	55.998	60.35	12.373	16.03
25.9	58.394 253	29.66 322	40.195 325	27.72 27	56.259 261	61.46 111	12.611 238	13.15 288
35.9	58.693 299	26.70 296	40.560 365	27.76 4	56.551 292	62.70 124	12.887 276	10.43 272
Mean Place	56.882	55.34	36.230	20.03	52.856	48.31	10.392	35.81
Sec $\delta$ , Tan $\delta$	1.327	+0.873	1.323	-0.866	1.033	-0.259	1.122	+0.509
$D_{\psi} a$ , $D_{\omega} a$	+0.04	+0.04	+0.08	-0.04	+0.07	-0.01	+0.05	+0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Cor. Bor. seq. Mag. 5.1		α Serpentis. Mag. 2.8		β Serpentis. Mag. 3.7		κ Serpentis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 36 s	° ' +36 53 "	h m 15 40 s	° ' + 6 40 "	h m 15 42 s	° ' +15 40 "	h m 15 45 s	° ' +18 23 "
Jan. 0.9	14.790	60.67	10.713	60.30	21.342	39.38	0.051	37.54
10.9	15.097 <sup>307</sup>	57.90 <sup>277</sup>	10.997 <sup>284</sup>	58.24 <sup>206</sup>	21.626 <sup>284</sup>	37.04 <sup>234</sup>	0.332 <sup>281</sup>	35.12 <sup>242</sup>
20.8	15.429 <sup>332</sup>	55.50 <sup>240</sup>	11.302 <sup>305</sup>	56.31 <sup>193</sup>	21.929 <sup>303</sup>	34.92 <sup>212</sup>	0.636 <sup>304</sup>	32.94 <sup>218</sup>
30.8	15.779 <sup>350</sup>	53.55 <sup>195</sup>	11.616 <sup>314</sup>	54.60 <sup>171</sup>	22.244 <sup>315</sup>	33.07 <sup>185</sup>	0.951 <sup>315</sup>	31.05 <sup>189</sup>
Feb. 9.8	16.135 <sup>356</sup>	52.14 <sup>141</sup>	11.932 <sup>316</sup>	53.14 <sup>146</sup>	22.562 <sup>318</sup>	31.58 <sup>149</sup>	1.271 <sup>320</sup>	29.55 <sup>150</sup>
	351	86	310	114	313	109	315	108
19.7	16.486	51.28	12.242	52.00	22.875	30.49	1.586	28.47
Mar. 1.7	16.825 <sup>339</sup>	51.01 <sup>27</sup>	12.539 <sup>297</sup>	51.22 <sup>78</sup>	23.176 <sup>301</sup>	29.84 <sup>65</sup>	1.890 <sup>304</sup>	27.84 <sup>63</sup>
11.7	17.143 <sup>318</sup>	51.33 <sup>32</sup>	12.820 <sup>281</sup>	50.79 <sup>43</sup>	23.462 <sup>286</sup>	29.63 <sup>21</sup>	2.178 <sup>288</sup>	27.69 <sup>15</sup>
21.7	17.434 <sup>291</sup>	52.20 <sup>87</sup>	13.080 <sup>260</sup>	50.74 <sup>5</sup>	23.726 <sup>264</sup>	29.85 <sup>22</sup>	2.445 <sup>267</sup>	27.99 <sup>30</sup>
31.6	17.695 <sup>261</sup>	53.58 <sup>138</sup>	13.318 <sup>238</sup>	51.03 <sup>29</sup>	23.966 <sup>240</sup>	30.48 <sup>63</sup>	2.689 <sup>244</sup>	28.71 <sup>72</sup>
	226	182	212	60	213	98	216	110
Apr. 10.6	17.921	55.40	13.530	51.63	24.179	31.46	2.905	29.81
20.6	18.110 <sup>189</sup>	57.58 <sup>218</sup>	13.716 <sup>186</sup>	52.49 <sup>86</sup>	24.365 <sup>186</sup>	32.76 <sup>130</sup>	3.093 <sup>188</sup>	31.22 <sup>141</sup>
30.6	18.260 <sup>150</sup>	60.01 <sup>243</sup>	13.873 <sup>157</sup>	53.56 <sup>107</sup>	24.521 <sup>156</sup>	34.29 <sup>153</sup>	3.250 <sup>157</sup>	32.90 <sup>168</sup>
May 10.5	18.369 <sup>109</sup>	62.63 <sup>262</sup>	14.002 <sup>129</sup>	54.80 <sup>124</sup>	24.647 <sup>126</sup>	36.01 <sup>172</sup>	3.377 <sup>127</sup>	34.74 <sup>184</sup>
20.5	18.438 <sup>69</sup>	65.31 <sup>268</sup>	14.102 <sup>100</sup>	56.14 <sup>134</sup>	24.742 <sup>95</sup>	37.82 <sup>181</sup>	3.472 <sup>95</sup>	36.68 <sup>194</sup>
	29	267	68	139	62	184	62	198
30.5	18.467	67.98	14.170	57.53	24.804	39.66	3.534	38.66
June 9.4	18.457 <sup>10</sup>	70.55 <sup>257</sup>	14.208 <sup>38</sup>	58.93 <sup>140</sup>	24.834 <sup>30</sup>	41.48 <sup>182</sup>	3.564 <sup>30</sup>	40.61 <sup>195</sup>
19.4	18.409 <sup>48</sup>	72.95 <sup>240</sup>	14.215 <sup>7</sup>	60.28 <sup>135</sup>	24.833 <sup>1</sup>	43.22 <sup>174</sup>	3.561 <sup>3</sup>	42.47 <sup>186</sup>
29.4	18.324 <sup>85</sup>	75.11 <sup>216</sup>	14.191 <sup>24</sup>	61.55 <sup>127</sup>	24.799 <sup>34</sup>	44.83 <sup>161</sup>	3.524 <sup>37</sup>	44.19 <sup>172</sup>
July 9.4	18.204 <sup>120</sup>	76.99 <sup>188</sup>	14.137 <sup>54</sup>	62.70 <sup>115</sup>	24.735 <sup>64</sup>	46.28 <sup>145</sup>	3.457 <sup>67</sup>	45.72 <sup>153</sup>
	151	153	82	102	92	123	96	132
19.3	18.053	78.52	14.055	63.72	24.643	47.51	3.361	47.04
29.3	17.877 <sup>176</sup>	79.67 <sup>115</sup>	13.947 <sup>108</sup>	64.58 <sup>86</sup>	24.524 <sup>119</sup>	48.53 <sup>102</sup>	3.238 <sup>123</sup>	48.10 <sup>106</sup>
Aug. 8.3	17.679 <sup>198</sup>	80.43 <sup>76</sup>	13.819 <sup>128</sup>	65.26 <sup>68</sup>	24.385 <sup>139</sup>	49.29 <sup>76</sup>	3.094 <sup>144</sup>	48.89 <sup>79</sup>
18.3	17.464 <sup>215</sup>	80.78 <sup>35</sup>	13.674 <sup>145</sup>	65.77 <sup>51</sup>	24.229 <sup>156</sup>	49.80 <sup>51</sup>	2.933 <sup>161</sup>	49.41 <sup>52</sup>
28.2	17.242 <sup>222</sup>	80.70 <sup>8</sup>	13.519 <sup>155</sup>	66.06 <sup>29</sup>	24.062 <sup>167</sup>	50.01 <sup>21</sup>	2.762 <sup>171</sup>	49.61 <sup>20</sup>
	223	52	157	9	168	6	174	10
Sept. 7.2	17.019	80.18	13.362	66.15	23.894	49.95	2.588	49.51
17.2	16.805 <sup>214</sup>	79.25 <sup>93</sup>	13.210 <sup>152</sup>	66.01 <sup>14</sup>	23.732 <sup>162</sup>	49.59 <sup>36</sup>	2.420 <sup>168</sup>	49.10 <sup>41</sup>
27.1	16.609 <sup>196</sup>	77.89 <sup>136</sup>	13.073 <sup>137</sup>	65.65 <sup>36</sup>	23.585 <sup>147</sup>	48.94 <sup>65</sup>	2.265 <sup>155</sup>	48.36 <sup>74</sup>
Oct. 7.1	16.440 <sup>169</sup>	76.13 <sup>176</sup>	12.959 <sup>114</sup>	65.04 <sup>61</sup>	23.458 <sup>127</sup>	47.97 <sup>97</sup>	2.133 <sup>132</sup>	47.31 <sup>105</sup>
17.1	16.308 <sup>132</sup>	74.00 <sup>213</sup>	12.877 <sup>82</sup>	64.20 <sup>84</sup>	23.363 <sup>95</sup>	46.72 <sup>125</sup>	2.033 <sup>100</sup>	45.96 <sup>135</sup>
	88	248	43	110	55	155	61	166
27.1	16.220	71.52	12.834	63.10	23.308	45.17	1.972	44.30
Nov. 6.0	16.183 <sup>37</sup>	68.76 <sup>276</sup>	12.835 <sup>1</sup>	61.77 <sup>133</sup>	23.299 <sup>9</sup>	43.37 <sup>180</sup>	1.956 <sup>16</sup>	42.38 <sup>192</sup>
16.0	16.201 <sup>18</sup>	65.75 <sup>301</sup>	12.885 <sup>50</sup>	60.20 <sup>157</sup>	23.338 <sup>39</sup>	41.33 <sup>204</sup>	1.990 <sup>34</sup>	40.20 <sup>218</sup>
26.0	16.278 <sup>77</sup>	62.58 <sup>317</sup>	12.984 <sup>99</sup>	58.44 <sup>176</sup>	23.428 <sup>90</sup>	39.09 <sup>224</sup>	2.075 <sup>85</sup>	37.83 <sup>237</sup>
Dec. 6.0	16.413 <sup>135</sup>	59.32 <sup>326</sup>	13.133 <sup>149</sup>	56.51 <sup>193</sup>	23.568 <sup>140</sup>	36.70 <sup>239</sup>	2.210 <sup>135</sup>	35.31 <sup>252</sup>
	191	325	194	204	187	248	183	260
15.9	16.604	56.07	13.327	54.47	23.755	34.22	2.393	32.71
25.9	16.844 <sup>240</sup>	52.92 <sup>315</sup>	13.560 <sup>233</sup>	52.37 <sup>210</sup>	23.984 <sup>229</sup>	31.74 <sup>248</sup>	2.619 <sup>226</sup>	30.13 <sup>258</sup>
35.9	17.125 <sup>281</sup>	49.99 <sup>293</sup>	13.826 <sup>266</sup>	50.28 <sup>209</sup>	24.247 <sup>263</sup>	29.33 <sup>241</sup>	2.880 <sup>261</sup>	27.63 <sup>250</sup>
Mean Place	15.152	76.73	10.702	69.49	21.414	50.67	0.164	49.35
Sec δ, Tan δ	1.250	+0.751	1.007	+0.117	1.039	+0.281	1.054	+0.333
D <sub>δ</sub> a, D <sub>α</sub> a	+0.04	+0.03	+0.06	0.00	+0.05	+0.01	+0.05	+0.01
D <sub>δ</sub> δ, D <sub>α</sub> δ	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Serpentis. Mag. 3.6		12 H. Draconis. Mag. 5.1		ε Serpentis. Mag. 3.8		ζ Ursæ Minoris. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 45 s	° ' " - 3 10 "	h m 15 45 s	° ' " +62 50 "	h m 15 46 s	° ' " + 4 43 "	h m 15 46 s	° ' " +78 2 "
Jan. 0.9	17.245	44.04	22.20	61.57	40.620	28.30	54.64	41.52
10.9	17.532 <sup>287</sup>	45.74 <sup>170</sup>	22.61 <sup>41</sup>	58.61 <sup>296</sup>	40.902 <sup>282</sup>	26.32 <sup>198</sup>	55.39 <sup>75</sup>	38.72 <sup>280</sup>
20.8	17.839 <sup>307</sup>	47.38 <sup>164</sup>	23.09 <sup>48</sup>	56.14 <sup>247</sup>	41.204 <sup>302</sup>	24.45 <sup>187</sup>	56.28 <sup>89</sup>	36.41 <sup>231</sup>
30.8	18.155 <sup>316</sup>	48.93 <sup>155</sup>	23.60 <sup>51</sup>	54.24 <sup>190</sup>	41.516 <sup>312</sup>	22.77 <sup>168</sup>	57.28 <sup>100</sup>	34.68 <sup>173</sup>
Feb. 9.8	18.473 <sup>318</sup>	50.32 <sup>139</sup>	24.13 <sup>53</sup>	52.95 <sup>129</sup>	41.831 <sup>315</sup>	21.32 <sup>145</sup>	58.34 <sup>106</sup>	33.58 <sup>110</sup>
	313	117	54	62	310	114	109	42
19.7	18.786	51.49	24.67	52.33	42.141	20.18	59.43	33.16
Mar. 1.7	19.086 <sup>300</sup>	52.40 <sup>91</sup>	25.20 <sup>53</sup>	52.41 <sup>8</sup>	42.440 <sup>299</sup>	19.37 <sup>81</sup>	60.50 <sup>107</sup>	33.41 <sup>25</sup>
11.7	19.372 <sup>286</sup>	53.04 <sup>64</sup>	25.71 <sup>51</sup>	53.14 <sup>73</sup>	42.724 <sup>284</sup>	18.90 <sup>47</sup>	61.52 <sup>102</sup>	34.33 <sup>92</sup>
21.7	19.638 <sup>266</sup>	53.42 <sup>38</sup>	26.17 <sup>46</sup>	54.50 <sup>136</sup>	42.987 <sup>263</sup>	18.78 <sup>12</sup>	62.46 <sup>94</sup>	35.86 <sup>153</sup>
31.6	19.882 <sup>244</sup>	53.51 <sup>9</sup>	26.58 <sup>41</sup>	56.43 <sup>193</sup>	43.230 <sup>243</sup>	19.00 <sup>22</sup>	63.28 <sup>82</sup>	37.93 <sup>207</sup>
	220	17	34	240	217	51	68	253
Apr. 10.6	20.102	53.34	26.92	58.83	43.447	19.51	63.96	40.46
20.6	20.297 <sup>195</sup>	52.97 <sup>37</sup>	27.19 <sup>27</sup>	61.60 <sup>277</sup>	43.639 <sup>192</sup>	20.29 <sup>78</sup>	64.46 <sup>50</sup>	43.34 <sup>288</sup>
30.6	20.464 <sup>167</sup>	52.42 <sup>56</sup>	27.39 <sup>20</sup>	64.65 <sup>305</sup>	43.803 <sup>164</sup>	21.28 <sup>99</sup>	64.80 <sup>34</sup>	46.46 <sup>312</sup>
May 10.5	20.605 <sup>141</sup>	51.71 <sup>71</sup>	27.51 <sup>12</sup>	67.85 <sup>320</sup>	43.940 <sup>137</sup>	22.43 <sup>115</sup>	64.94 <sup>14</sup>	49.71 <sup>325</sup>
20.5	20.715 <sup>110</sup>	50.91 <sup>80</sup>	27.55 <sup>4</sup>	71.11 <sup>326</sup>	44.046 <sup>106</sup>	23.68 <sup>125</sup>	64.92 <sup>2</sup>	52.98 <sup>327</sup>
	81	87	3	320	76	131	21	319
30.5	20.796 <sup>51</sup>	50.04 <sup>89</sup>	27.52 <sup>11</sup>	74.31 <sup>304</sup>	44.122 <sup>46</sup>	24.99 <sup>132</sup>	64.71 <sup>39</sup>	56.17 <sup>299</sup>
June 9.4	20.847 <sup>18</sup>	49.15 <sup>89</sup>	27.41 <sup>19</sup>	77.35 <sup>281</sup>	44.168 <sup>14</sup>	26.31 <sup>128</sup>	64.32 <sup>54</sup>	59.16 <sup>273</sup>
19.4	20.865 <sup>13</sup>	48.26 <sup>87</sup>	27.22 <sup>24</sup>	80.16 <sup>249</sup>	44.182 <sup>18</sup>	27.59 <sup>122</sup>	63.78 <sup>68</sup>	61.89 <sup>240</sup>
29.4	20.852 <sup>43</sup>	47.39 <sup>82</sup>	26.98 <sup>30</sup>	82.65 <sup>210</sup>	44.164 <sup>48</sup>	28.81 <sup>111</sup>	63.10 <sup>82</sup>	64.29 <sup>199</sup>
July 9.4	20.809 <sup>74</sup>	46.57 <sup>75</sup>	26.68 <sup>36</sup>	84.75 <sup>167</sup>	44.116 <sup>77</sup>	29.92 <sup>99</sup>	62.28 <sup>92</sup>	66.28 <sup>154</sup>
19.3	20.735 <sup>99</sup>	45.82 <sup>66</sup>	26.32 <sup>40</sup>	86.42 <sup>121</sup>	44.039 <sup>103</sup>	30.91 <sup>85</sup>	61.36 <sup>100</sup>	67.82 <sup>106</sup>
29.3	20.636 <sup>123</sup>	45.16 <sup>58</sup>	25.92 <sup>42</sup>	87.63 <sup>71</sup>	43.936 <sup>126</sup>	31.76 <sup>68</sup>	60.36 <sup>107</sup>	68.87 <sup>55</sup>
Aug. 8.3	20.513 <sup>139</sup>	44.58 <sup>49</sup>	25.50 <sup>45</sup>	88.34 <sup>20</sup>	43.810 <sup>143</sup>	32.44 <sup>52</sup>	59.29 <sup>110</sup>	69.42 <sup>3</sup>
18.3	20.374 <sup>150</sup>	44.09 <sup>38</sup>	25.05 <sup>47</sup>	88.54 <sup>32</sup>	43.667 <sup>154</sup>	32.96 <sup>34</sup>	58.19 <sup>111</sup>	69.45 <sup>51</sup>
28.2	20.224 <sup>154</sup>	43.71 <sup>25</sup>	24.58 <sup>46</sup>	88.22 <sup>84</sup>	43.513 <sup>158</sup>	33.30 <sup>13</sup>	57.08 <sup>111</sup>	68.94 <sup>101</sup>
Sept. 7.2	20.070	43.46	24.12	87.38	43.355	33.43	55.97	67.93
17.2	19.921 <sup>149</sup>	43.34 <sup>12</sup>	23.68 <sup>44</sup>	86.04 <sup>134</sup>	43.202 <sup>153</sup>	33.37 <sup>6</sup>	54.90 <sup>107</sup>	66.43 <sup>150</sup>
27.1	19.785 <sup>136</sup>	43.36 <sup>2</sup>	23.26 <sup>42</sup>	84.21 <sup>183</sup>	43.063 <sup>139</sup>	33.08 <sup>29</sup>	53.90 <sup>100</sup>	64.45 <sup>198</sup>
Oct. 7.1	19.673 <sup>112</sup>	43.55 <sup>19</sup>	22.89 <sup>37</sup>	81.92 <sup>229</sup>	42.946 <sup>117</sup>	32.58 <sup>50</sup>	53.00 <sup>90</sup>	62.04 <sup>241</sup>
17.1	19.592 <sup>81</sup>	43.92 <sup>37</sup>	22.57 <sup>32</sup>	79.22 <sup>270</sup>	42.860 <sup>86</sup>	31.85 <sup>73</sup>	52.20 <sup>80</sup>	59.25 <sup>279</sup>
	41	56	25	305	48	97	64	314
27.1	19.551	44.48	22.32	76.17	42.812 <sup>3</sup>	30.88	51.56 <sup>50</sup>	56.11
Nov. 6.0	19.554 <sup>3</sup>	45.25 <sup>77</sup>	22.16 <sup>16</sup>	72.82 <sup>335</sup>	42.809 <sup>45</sup>	29.66 <sup>122</sup>	51.06 <sup>31</sup>	52.71 <sup>340</sup>
16.0	19.605 <sup>51</sup>	46.22 <sup>97</sup>	22.08 <sup>8</sup>	69.24 <sup>358</sup>	42.854 <sup>95</sup>	28.24 <sup>142</sup>	50.75 <sup>12</sup>	49.10 <sup>361</sup>
26.0	19.707 <sup>102</sup>	47.40 <sup>118</sup>	22.09 <sup>1</sup>	65.54 <sup>370</sup>	42.949 <sup>144</sup>	26.60 <sup>164</sup>	50.63 <sup>8</sup>	45.40 <sup>370</sup>
Dec. 6.0	19.858 <sup>151</sup>	48.76 <sup>136</sup>	22.19 <sup>10</sup>	61.80 <sup>374</sup>	43.093 <sup>188</sup>	24.80 <sup>180</sup>	50.71 <sup>28</sup>	41.70 <sup>370</sup>
	197	151	20	367	183	193		358
15.9	20.055	50.27	22.39	58.13	43.281	22.87	50.99	38.12
25.9	20.290 <sup>235</sup>	51.90 <sup>163</sup>	22.68 <sup>29</sup>	54.65 <sup>348</sup>	43.510 <sup>229</sup>	20.87 <sup>200</sup>	51.47 <sup>48</sup>	34.74 <sup>338</sup>
35.9	20.559 <sup>269</sup>	53.58 <sup>168</sup>	23.06 <sup>38</sup>	51.46 <sup>319</sup>	43.773 <sup>263</sup>	18.87 <sup>200</sup>	52.13 <sup>66</sup>	31.69 <sup>306</sup>
Mean Place	17.206	37.38	23.868	80.66	40.625	36.86	59.691	61.37
Sec δ, Tan δ	1.002	-0.056	2.192	+1.950	1.003	+0.083	4.829	+4.724
Dψ α, Dω α	+0.06	0.00	+0.02	+0.07	+0.06	0.00	-0.04	+0.17
Dψ δ, Dω δ	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8



**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Herculis. Mag. 5.3			Groombridge 2820. Mag. 5.4			φ Herculis. Mag. 4.3			δ <sup>1</sup> Apodis. Mag. 4.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	16	4	+17 15	16	6	+68 1	16	6	+45 8	16	7	-78 29
	s		"	s		"	s		"	s		"
Jan. 0.9	19.448		50.62	2.89		25.14	8.463		51.56	50.83		13.98
10.9	19.716 <sup>268</sup>		48.22 <sup>240</sup>	3.32 <sup>43</sup>		22.07 <sup>307</sup>	8.759 <sup>296</sup>		48.56 <sup>300</sup>	51.95 <sup>112</sup>		12.30 <sup>168</sup>
20.8	20.007 <sup>291</sup>		46.03 <sup>219</sup>	3.84 <sup>52</sup>		19.45 <sup>262</sup>	9.091 <sup>332</sup>		45.92 <sup>264</sup>	53.18 <sup>123</sup>		11.10 <sup>120</sup>
30.8	20.315 <sup>308</sup>		44.13 <sup>190</sup>	4.41 <sup>57</sup>		17.38 <sup>207</sup>	9.452 <sup>361</sup>		43.75 <sup>217</sup>	54.49 <sup>131</sup>		10.38 <sup>72</sup>
Feb. 9.8	20.628 <sup>313</sup>		42.58 <sup>155</sup>	5.03 <sup>62</sup>		15.93 <sup>145</sup>	9.828 <sup>376</sup>		42.12 <sup>163</sup>	55.85 <sup>136</sup>		10.16 <sup>22</sup>
		314	114		63	79		382	102		138	28
19.8	20.942		41.44	5.66		15.14	10.210		41.10	57.23		10.44
Mar. 1.7	21.248 <sup>306</sup>		40.75 <sup>69</sup>	6.30 <sup>64</sup>		15.02 <sup>12</sup>	10.586 <sup>376</sup>		40.71 <sup>39</sup>	58.59 <sup>136</sup>		11.19 <sup>75</sup>
11.7	21.542 <sup>294</sup>		40.52 <sup>23</sup>	6.90 <sup>60</sup>		15.59 <sup>57</sup>	10.948 <sup>362</sup>		40.95 <sup>24</sup>	59.92 <sup>133</sup>		12.39 <sup>120</sup>
21.7	21.817 <sup>275</sup>		40.74 <sup>22</sup>	7.47 <sup>57</sup>		16.81 <sup>122</sup>	11.286 <sup>338</sup>		41.80 <sup>85</sup>	61.18 <sup>126</sup>		13.99 <sup>160</sup>
31.6	22.073 <sup>256</sup>		41.38 <sup>64</sup>	7.99 <sup>52</sup>		18.61 <sup>180</sup>	11.594 <sup>308</sup>		43.22 <sup>142</sup>	62.34 <sup>116</sup>		15.96 <sup>197</sup>
		229	104		44	232		273	191		107	228
Apr. 10.6	22.302		42.42	8.43		20.93	11.867		45.13	63.41		18.24
20.6	22.506 <sup>204</sup>		43.78 <sup>136</sup>	8.79 <sup>36</sup>		23.65 <sup>272</sup>	12.102 <sup>235</sup>		47.46 <sup>233</sup>	64.35 <sup>94</sup>		20.78 <sup>254</sup>
30.6	22.682 <sup>176</sup>		45.40 <sup>162</sup>	9.06 <sup>27</sup>		26.68 <sup>303</sup>	12.293 <sup>191</sup>		50.11 <sup>265</sup>	65.16 <sup>81</sup>		23.52 <sup>274</sup>
May 10.5	22.828 <sup>146</sup>		47.22 <sup>182</sup>	9.23 <sup>17</sup>		29.90 <sup>322</sup>	12.438 <sup>145</sup>		52.97 <sup>286</sup>	65.81 <sup>65</sup>		26.41 <sup>289</sup>
20.5	22.942 <sup>114</sup>		49.16 <sup>194</sup>	9.30 <sup>7</sup>		33.22 <sup>332</sup>	12.536 <sup>98</sup>		55.95 <sup>298</sup>	66.30 <sup>49</sup>		29.38 <sup>297</sup>
		82	200		2	331		50	301		32	300
30.5	23.024		51.16	9.28		36.53	12.586		58.96	66.62		32.38
June 9.5	23.072 <sup>48</sup>		53.14 <sup>198</sup>	9.17 <sup>11</sup>		39.71 <sup>318</sup>	12.589 <sup>3</sup>		61.90 <sup>294</sup>	66.75 <sup>13</sup>		35.32 <sup>294</sup>
19.4	23.086 <sup>14</sup>		55.04 <sup>190</sup>	8.96 <sup>21</sup>		42.66 <sup>295</sup>	12.545 <sup>44</sup>		64.68 <sup>278</sup>	66.72 <sup>3</sup>		38.14 <sup>282</sup>
29.4	23.065 <sup>21</sup>		56.83 <sup>179</sup>	8.67 <sup>29</sup>		45.35 <sup>269</sup>	12.456 <sup>89</sup>		67.23 <sup>255</sup>	66.50 <sup>22</sup>		40.75 <sup>261</sup>
July 9.4	23.013 <sup>52</sup>		58.44 <sup>161</sup>	8.30 <sup>37</sup>		47.68 <sup>233</sup>	12.324 <sup>132</sup>		69.47 <sup>224</sup>	66.12 <sup>38</sup>		43.10 <sup>235</sup>
		84	141		44	191		171	191		53	201
19.3	22.929		59.85	7.86		49.59	12.153		71.38	65.59		45.11
29.3	22.815 <sup>114</sup>		61.01 <sup>116</sup>	7.38 <sup>48</sup>		51.02 <sup>143</sup>	11.946 <sup>207</sup>		72.89 <sup>151</sup>	64.92 <sup>67</sup>		46.73 <sup>162</sup>
Aug. 8.3	22.679 <sup>136</sup>		61.91 <sup>90</sup>	6.83 <sup>55</sup>		51.99 <sup>97</sup>	11.712 <sup>234</sup>		73.96 <sup>107</sup>	64.12 <sup>80</sup>		47.89 <sup>116</sup>
18.3	22.521 <sup>158</sup>		62.54 <sup>63</sup>	6.26 <sup>57</sup>		52.43 <sup>44</sup>	11.455 <sup>257</sup>		74.58 <sup>62</sup>	63.24 <sup>88</sup>		48.55 <sup>66</sup>
28.2	22.349 <sup>172</sup>		62.88 <sup>34</sup>	5.67 <sup>59</sup>		52.37 <sup>6</sup>	11.184 <sup>271</sup>		74.74 <sup>16</sup>	62.32 <sup>92</sup>		48.68 <sup>13</sup>
		177	2		59	60		276	31		94	41
Sept. 7.2	22.172		62.90	5.08		51.77	10.908		74.43	61.38		48.27
17.2	21.997 <sup>175</sup>		62.64 <sup>26</sup>	4.50 <sup>58</sup>		50.65 <sup>112</sup>	10.634 <sup>274</sup>		73.65 <sup>78</sup>	60.46 <sup>92</sup>		47.32 <sup>95</sup>
27.2	21.833 <sup>164</sup>		62.05 <sup>59</sup>	3.94 <sup>56</sup>		49.05 <sup>160</sup>	10.377 <sup>257</sup>		72.39 <sup>126</sup>	59.60 <sup>86</sup>		45.86 <sup>146</sup>
Oct. 7.1	21.690 <sup>143</sup>		61.14 <sup>91</sup>	3.44 <sup>50</sup>		46.95 <sup>210</sup>	10.144 <sup>233</sup>		70.69 <sup>170</sup>	58.86 <sup>74</sup>		43.93 <sup>193</sup>
17.1	21.576 <sup>114</sup>		59.93 <sup>121</sup>	2.99 <sup>45</sup>		44.43 <sup>252</sup>	9.948 <sup>196</sup>		68.56 <sup>213</sup>	58.25 <sup>61</sup>		41.62 <sup>231</sup>
		77	151		37	291		152	251		43	265
27.1	21.499		58.42	2.62		41.52	9.796		66.05	57.82		38.97
Nov. 6.0	21.467 <sup>32</sup>		56.63 <sup>179</sup>	2.34 <sup>28</sup>		38.27 <sup>325</sup>	9.698 <sup>98</sup>		63.21 <sup>284</sup>	57.60 <sup>22</sup>		36.11 <sup>266</sup>
16.0	21.482 <sup>15</sup>		54.59 <sup>204</sup>	2.17 <sup>17</sup>		34.78 <sup>349</sup>	9.659 <sup>39</sup>		60.08 <sup>313</sup>	57.59 <sup>1</sup>		33.13 <sup>298</sup>
26.0	21.547 <sup>65</sup>		52.33 <sup>226</sup>	2.10 <sup>7</sup>		31.12 <sup>366</sup>	9.683 <sup>24</sup>		56.76 <sup>332</sup>	57.81 <sup>22</sup>		30.15 <sup>298</sup>
Dec. 6.0	21.663 <sup>116</sup>		49.92 <sup>241</sup>	2.15 <sup>5</sup>		27.39 <sup>373</sup>	9.773 <sup>90</sup>		53.31 <sup>345</sup>	58.25 <sup>44</sup>		27.28 <sup>287</sup>
		165	250		16	369		153	346		66	265
15.9	21.828		47.42	2.31		23.70	9.926		49.85	58.91		24.63
25.9	22.036 <sup>208</sup>		44.89 <sup>253</sup>	2.58 <sup>27</sup>		20.16 <sup>354</sup>	10.139 <sup>213</sup>		46.47 <sup>338</sup>	59.75 <sup>84</sup>		22.28 <sup>235</sup>
35.9	22.281 <sup>245</sup>		42.41 <sup>248</sup>	2.96 <sup>38</sup>		16.88 <sup>328</sup>	10.404 <sup>265</sup>		43.29 <sup>318</sup>	60.78 <sup>103</sup>		20.32 <sup>196</sup>
Mean Place	19.637		61.45	5.472		43.00	9.264		67.12	53.722		20.42
Sec δ, Tan δ	1.047		+0.311	2.672		+2.478	1.418		+1.005	5.012		-4.911
D <sub>ψ</sub> α, D <sub>α</sub> α	+0.05		+0.01	0.00		+0.08	+0.04		+0.03	+0.18		-0.16
D <sub>ψ</sub> δ, D <sub>α</sub> δ	-0.2		-0.9	-0.2		-0.9	-0.2		-0.9	-0.2		-0.9

FOR THE UPPER TRANSIT AT







**FOR THE UPPER TRANSIT AT WASHINGTON.**

### APPARENT PLACES OF STARS, 1917.

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FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Herculis. Mag. 3.0		α Triang. Aust. Mag. 1.9		η Herculis. Mag. 3.6		Groombridge 2377. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 38 s	° ' " +31 44 "	h m 16 39 s	° ' " -68 52 "	h m 16 40 s	° ' " +39 4 "	h m 16 43 s	° ' " +56 55 "
Jan. 0.9	8.835	57.32	50.40	33.37	2.192	33.37	41.630	33.68
10.9	9.078 243	54.47 285	51.01 61	31.66 171	2.441 249	30.33 304	41.914 284	30.39 329
20.9	9.355 277	51.89 258	51.69 68	30.33 133	2.728 287	27.59 274	42.258 344	27.45 294
30.8	9.659 304	49.66 223	52.42 73	29.38 95	3.046 318	25.24 235	42.650 392	24.97 248
Feb. 9.8	9.978 319	47.86 180	53.19 77	28.87 51	3.384 338	23.36 188	43.077 427	23.03 194
	328	129	79	9	348	183	451	132
19.8	10.306	46.57 74	53.98	28.78	3.732	22.03 74	43.528	21.71 67
Mar. 1.8	10.635 329	45.83 18	54.77 79	29.09 31	4.083 351	21.29 13	43.986 458	21.04 1
11.7	10.957 322	45.65 39	55.55 78	29.79 70	4.428 345	21.16 49	44.440 454	21.05 67
21.7	11.265 308	46.04 92	56.31 76	30.86 107	4.759 331	21.65 105	44.877 437	21.72 130
31.7	11.556 291	46.96 141	57.03 72	32.24 138	5.069 310	22.70 157	45.285 408	23.02 188
	267		67	169	286		371	
Apr. 10.6	11.823	48.37 184	57.70	33.93	5.355	24.27 202	45.656	24.90 235
20.6	12.064 241	50.21 218	58.31 61	35.87 194	5.610 255	26.29 238	45.982 326	27.25 274
30.6	12.273 209	52.39 244	58.85 54	38.04 217	5.830 220	28.67 267	46.254 215	29.99 304
May 10.6	12.448 175	54.83 262	59.33 48	40.37 233	6.012 182	31.34 283	46.469 152	33.03 322
20.5	12.590 142	57.45 269	59.72 39	42.83 246	6.155 143	34.17 293	46.621 87	36.25 331
	102		30	252	100			
30.5	12.692	60.14 270	60.02	45.35	6.255	37.10 292	46.708	39.56 329
June 9.5	12.754 62	62.84 261	60.23 21	47.89 254	6.311 56	40.02 283	46.730 43	42.85 318
19.5	12.777 23	65.45 248	60.32 9	50.37 248	6.323 12	42.85 266	46.687 106	46.03 298
29.4	12.759 18	67.93 226	60.32 0	52.74 237	6.289 34	45.51 244	46.581 166	49.01 271
July 9.4	12.700 59	70.19 199	60.22 10	54.93 219	6.212 77	47.95 213	46.415 223	51.72 236
	95		19	195	118			
19.4	12.605	72.18 168	60.03	56.88	6.094	50.08 180	46.192	54.08 197
29.3	12.473 132	73.86 134	59.75 28	58.51 126	5.938 156	51.88 142	45.918 317	56.05 154
Aug. 8.3	12.310 163	75.20 97	59.39 36	59.77 86	5.749 189	53.30 101	45.601 352	57.59 106
18.3	12.122 188	76.17 58	58.95 44	60.63 40	5.532 217	54.31 58	45.249 377	58.65 57
28.3	11.914 208	76.75 17	58.48 47	61.03 7	5.295 237	54.89 13	44.872 392	59.22 7
	219		50		248			
Sept. 7.2	11.695	76.92 25	57.98	60.96	5.047	55.02 32	44.480	59.29 45
17.2	11.473 222	76.67 66	57.48 50	60.41 103	4.795 252	54.70 78	44.085 385	58.84 97
27.2	11.259 214	74.94 107	56.99 49	59.38 146	4.550 245	52.70 122	43.700 361	57.87 146
Oct. 7.2	11.060 199	73.47 147	56.56 43	57.92 187	4.323 227	51.05 165	43.339 326	56.41 194
17.1	10.888 172	71.64 219	56.19 37	56.05 220	4.124 199	48.99 242	43.013 278	54.47 237
	136		28		162			
27.1	10.752	69.45 249	55.91 17	53.85 243	3.962 115	46.57 274	42.735 219	52.10 278
Nov. 6.1	10.657 43	66.96 275	55.74 6	51.42 260	3.847 63	43.83 301	42.516 149	49.32 312
16.0	10.614	61.29 292	55.68 8	48.82 265	3.784 7	40.82 318	42.367 74	46.20 338
26.0	10.624 10	58.26 304	55.76 20	46.17 260	3.777 54	37.64 328	42.293 6	42.82 356
Dec. 6.0	10.688 64	55.22 294	55.96 33	43.57 246	3.831 112	34.36 327	42.299 87	39.26 363
	119							
16.0	10.807	52.28	56.29	41.11	3.943	31.09 316	42.386	35.63 358
25.9	10.977 170		56.73 44	38.88 223	4.111 168	27.93	42.552 166	32.05 343
35.9	11.193 216		57.28 55	36.93 195	4.329 218		42.791 239	28.62
Mean Place	9.418	68.88	51.756	37.47	2.984	45.77	43.346	47.51
Sec δ, Tan δ	1.176	+0.619	2.775	-2.589	1.288	+0.812	1.833	+1.536
Dψ α, Dω α	+0.05	+0.01	+0.13	-0.06	+0.04	+0.02	+0.02	+0.03
Dψ δ, Dω δ	-0.1	-0.9	-0.1	-0.9	-0.1	-0.9	-0.1	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Scorpil. Mag. 2.4		49 Herculis. Mag. 6.4		ε¹ Aræ. Mag. 4.2		κ Ophiuchi. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 44 s	° ' -34 8 "	h m 16 48 s	° ' +15 6 "	h m 16 52 s	° ' -53 1 "	h m 16 53 s	° ' + 9 29 "
Jan. 0.9	46.842	38.20	17.752	36.52	57.231	62.11	44.031	63.90
10.9	47.142 <sup>300</sup>	38.09 <sup>11</sup>	17.984 <sup>232</sup>	34.21 <sup>231</sup>	57.611 <sup>380</sup>	60.96 <sup>115</sup>	44.261 <sup>230</sup>	61.84 <sup>206</sup>
20.9	47.473 <sup>331</sup>	38.16 <sup>7</sup>	18.247 <sup>263</sup>	32.06 <sup>215</sup>	58.036 <sup>425</sup>	60.08 <sup>88</sup>	44.520 <sup>259</sup>	59.89 <sup>196</sup>
30.8	47.827 <sup>354</sup>	38.40 <sup>24</sup>	18.530 <sup>283</sup>	30.14 <sup>192</sup>	58.496 <sup>460</sup>	59.51 <sup>57</sup>	44.799 <sup>279</sup>	58.14 <sup>175</sup>
Feb. 9.8	48.193 <sup>366</sup>	38.77 <sup>37</sup>	18.828 <sup>298</sup>	28.54 <sup>160</sup>	58.978 <sup>482</sup>	59.24 <sup>27</sup>	45.093 <sup>294</sup>	56.64 <sup>150</sup>
	871	49	305	123	494	0	301	117
19.8	48.564	39.26	19.133	27.31	59.472	59.24	45.394	55.47
Mar. 1.8	48.935 <sup>371</sup>	39.84 <sup>58</sup>	19.437 <sup>304</sup>	26.49 <sup>82</sup>	59.968 <sup>496</sup>	59.52 <sup>28</sup>	45.695 <sup>301</sup>	54.66 <sup>81</sup>
11.7	49.299 <sup>364</sup>	40.48 <sup>64</sup>	19.738 <sup>301</sup>	26.12 <sup>37</sup>	60.458 <sup>490</sup>	60.05 <sup>53</sup>	45.993 <sup>298</sup>	54.24 <sup>42</sup>
21.7	49.650 <sup>351</sup>	41.17 <sup>69</sup>	20.028 <sup>290</sup>	26.19 <sup>7</sup>	60.935 <sup>477</sup>	60.83 <sup>78</sup>	46.282 <sup>289</sup>	54.22 <sup>2</sup>
31.7	49.986 <sup>336</sup>	41.88 <sup>71</sup>	20.304 <sup>276</sup>	26.69 <sup>50</sup>	61.393 <sup>458</sup>	61.81 <sup>98</sup>	46.558 <sup>276</sup>	54.59 <sup>37</sup>
	317	74	258	90	432	117	259	73
Apr. 10.7	50.303	42.62	20.562	27.59	61.825	62.98	46.817	55.32
20.6	50.597 <sup>294</sup>	43.36 <sup>74</sup>	20.800 <sup>238</sup>	28.85 <sup>126</sup>	62.227 <sup>402</sup>	64.31 <sup>133</sup>	47.057 <sup>240</sup>	56.38 <sup>106</sup>
30.6	50.865 <sup>268</sup>	44.12 <sup>76</sup>	21.013 <sup>213</sup>	30.40 <sup>155</sup>	62.593 <sup>366</sup>	65.80 <sup>149</sup>	47.275 <sup>218</sup>	57.69 <sup>131</sup>
May 10.6	51.105 <sup>240</sup>	44.88 <sup>76</sup>	21.200 <sup>187</sup>	32.16 <sup>176</sup>	62.920 <sup>327</sup>	67.40 <sup>160</sup>	47.468 <sup>193</sup>	59.20 <sup>151</sup>
20.5	51.312 <sup>207</sup>	45.64 <sup>76</sup>	21.358 <sup>158</sup>	34.08 <sup>192</sup>	63.199 <sup>279</sup>	69.08 <sup>168</sup>	47.632 <sup>164</sup>	60.88 <sup>168</sup>
	170	77	125	201	228	174	135	175
30.5	51.482	46.41	21.483	36.09	63.427	70.82	47.767	62.63
June 9.5	51.613 <sup>131</sup>	47.16 <sup>75</sup>	21.575 <sup>92</sup>	38.13 <sup>204</sup>	63.601 <sup>174</sup>	72.58 <sup>176</sup>	47.868 <sup>101</sup>	64.40 <sup>177</sup>
19.5	51.703 <sup>90</sup>	47.88 <sup>72</sup>	21.631 <sup>56</sup>	40.12 <sup>199</sup>	63.717 <sup>116</sup>	74.31 <sup>173</sup>	47.934 <sup>66</sup>	66.15 <sup>175</sup>
29.4	51.749 <sup>46</sup>	48.55 <sup>67</sup>	21.650 <sup>19</sup>	42.02 <sup>190</sup>	63.771 <sup>54</sup>	75.97 <sup>166</sup>	47.963 <sup>29</sup>	67.81 <sup>166</sup>
July 9.4	51.750 <sup>1</sup>	49.17 <sup>62</sup>	21.632 <sup>18</sup>	43.79 <sup>177</sup>	63.763 <sup>8</sup>	77.54 <sup>157</sup>	47.956 <sup>7</sup>	69.37 <sup>156</sup>
	42	54	53	157	68	140	42	140
19.4	51.708	49.71	21.579	45.36	63.695	78.94	47.914	70.77
29.4	51.623 <sup>85</sup>	50.14 <sup>43</sup>	21.492 <sup>87</sup>	46.73 <sup>137</sup>	63.569 <sup>126</sup>	80.11 <sup>117</sup>	47.836 <sup>78</sup>	71.99 <sup>122</sup>
Aug. 8.3	51.501 <sup>122</sup>	50.42 <sup>28</sup>	21.373 <sup>119</sup>	47.85 <sup>112</sup>	63.391 <sup>178</sup>	81.05 <sup>94</sup>	47.727 <sup>109</sup>	73.01 <sup>102</sup>
18.3	51.347 <sup>154</sup>	50.54 <sup>12</sup>	21.229 <sup>144</sup>	48.72 <sup>87</sup>	63.168 <sup>223</sup>	81.68 <sup>63</sup>	47.592 <sup>135</sup>	73.82 <sup>81</sup>
28.3	51.168 <sup>179</sup>	50.50 <sup>4</sup>	21.063 <sup>166</sup>	49.30 <sup>58</sup>	62.911 <sup>257</sup>	81.99 <sup>31</sup>	47.434 <sup>158</sup>	74.39 <sup>57</sup>
	194	22	178	30	278	3	171	32
Sept. 7.2	50.974	50.28	20.885	49.60	62.633	81.96	47.263	74.71
17.2	50.776 <sup>198</sup>	49.88 <sup>40</sup>	20.703 <sup>182</sup>	49.61 <sup>1</sup>	62.348 <sup>285</sup>	81.56 <sup>40</sup>	47.087 <sup>176</sup>	74.80 <sup>9</sup>
27.2	50.584 <sup>192</sup>	49.31 <sup>57</sup>	20.525 <sup>178</sup>	49.30 <sup>31</sup>	62.070 <sup>278</sup>	80.81 <sup>75</sup>	46.915 <sup>172</sup>	74.62 <sup>18</sup>
Oct. 7.2	50.411 <sup>173</sup>	48.59 <sup>72</sup>	20.361 <sup>164</sup>	48.70 <sup>60</sup>	61.815 <sup>255</sup>	79.73 <sup>108</sup>	46.756 <sup>159</sup>	74.19 <sup>43</sup>
17.1	50.267 <sup>144</sup>	47.76 <sup>83</sup>	20.219 <sup>142</sup>	47.80 <sup>90</sup>	61.599 <sup>216</sup>	78.37 <sup>136</sup>	46.618 <sup>138</sup>	73.49 <sup>70</sup>
	103	91	108	121	163	161	106	96
27.1	50.164	46.85	20.111	46.59	61.436	76.76	46.512	72.53
Nov. 6.1	50.110 <sup>54</sup>	45.91 <sup>94</sup>	20.042 <sup>69</sup>	45.11 <sup>148</sup>	61.338 <sup>98</sup>	74.98 <sup>178</sup>	46.444 <sup>68</sup>	71.31 <sup>122</sup>
16.1	50.112 <sup>2</sup>	44.99 <sup>92</sup>	20.017 <sup>25</sup>	43.35 <sup>176</sup>	61.311 <sup>27</sup>	73.09 <sup>189</sup>	46.421 <sup>23</sup>	69.85 <sup>146</sup>
26.0	50.172 <sup>60</sup>	44.14 <sup>85</sup>	20.041 <sup>24</sup>	41.37 <sup>198</sup>	61.363 <sup>52</sup>	71.17 <sup>192</sup>	46.445 <sup>24</sup>	68.17 <sup>168</sup>
Dec. 6.0	50.291 <sup>119</sup>	43.41 <sup>73</sup>	20.115 <sup>74</sup>	39.19 <sup>218</sup>	61.495 <sup>132</sup>	69.31 <sup>186</sup>	46.518 <sup>73</sup>	66.31 <sup>186</sup>
	175	60	123	230	208	174	121	200
16.0	50.466	42.81	20.238	36.89	61.703	67.57	46.639	64.31
25.9	50.694 <sup>228</sup>	42.39 <sup>42</sup>	20.405 <sup>167</sup>	34.53 <sup>236</sup>	61.984 <sup>281</sup>	66.01 <sup>156</sup>	46.805 <sup>166</sup>	62.24 <sup>207</sup>
35.9	50.967 <sup>273</sup>	42.15 <sup>24</sup>	20.614 <sup>209</sup>	32.18 <sup>235</sup>	62.327 <sup>343</sup>	64.67 <sup>134</sup>	47.011 <sup>206</sup>	60.15 <sup>209</sup>
Mean Place	47.028	37.71	18.083	45.09	57.748	63.96	44.315	71.40
Sec δ, Tan δ	1.208	-0.678	1.036	+0.270	1.663	-1.329	1.014	+0.168
Dψ α, Dω α	+0.08	-0.01	+0.05	+0.01	+0.09	-0.03	+0.06	0.00
Dψ δ, Dω δ	-0.1	-0.9	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	80 Ophiuchi. Mag. 5.0			ε Herculis. Mag. 3.9			δ Herculis. Mag. 5.3			η Ophiuchi. Mag. 2.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''
	16	56	— 4   5	16	57	+31   2	16	58	+33   40	17	5	—15   37
	s		"	s		"	s		"	s		"
Jan. 0.9	40.810		61.88	6.161		42.05	31.699		65.03	36.776		26.73
10.9	41.047 <sup>237</sup>		63.29 <sup>141</sup>	6.387 <sup>226</sup>		39.19 <sup>286</sup>	31.925 <sup>226</sup>		62.09 <sup>294</sup>	37.020 <sup>244</sup>		27.49 <sup>76</sup>
20.9	41.313 <sup>266</sup>		64.67 <sup>138</sup>	6.649 <sup>262</sup>		36.56 <sup>263</sup>	32.188 <sup>263</sup>		59.40 <sup>269</sup>	37.293 <sup>273</sup>		28.29 <sup>80</sup>
30.8	41.598 <sup>285</sup>		65.97 <sup>130</sup>	6.938 <sup>289</sup>		34.24 <sup>232</sup>	32.481 <sup>293</sup>		57.03 <sup>237</sup>	37.588 <sup>295</sup>		29.09 <sup>80</sup>
Feb. 9.8	41.896 <sup>298</sup>		67.11 <sup>114</sup>	7.248 <sup>310</sup>		32.35 <sup>189</sup>	32.796 <sup>315</sup>		55.10 <sup>193</sup>	37.898 <sup>310</sup>		29.86 <sup>77</sup>
		307	97		321	139		326	144		317	68
19.8	42.203		68.08	7.569		30.96	33.122		53.66	38.215		30.54
Mar. 1.8	42.509 <sup>306</sup>		68.81 <sup>73</sup>	7.895 <sup>326</sup>		30.08 <sup>88</sup>	33.453 <sup>331</sup>		52.78 <sup>88</sup>	38.534 <sup>319</sup>		31.12 <sup>58</sup>
11.7	42.810 <sup>301</sup>		69.29 <sup>48</sup>	8.218 <sup>323</sup>		29.77 <sup>31</sup>	33.783 <sup>330</sup>		52.48 <sup>30</sup>	38.850 <sup>316</sup>		31.57 <sup>45</sup>
21.7	43.104 <sup>294</sup>		69.49 <sup>20</sup>	8.531 <sup>313</sup>		30.03 <sup>26</sup>	34.104 <sup>321</sup>		52.76 <sup>28</sup>	39.160 <sup>310</sup>		31.85 <sup>28</sup>
31.7	43.385 <sup>281</sup>		69.43 <sup>6</sup>	8.830 <sup>299</sup>		30.83 <sup>80</sup>	34.408 <sup>304</sup>		53.59 <sup>83</sup>	39.457 <sup>297</sup>		31.99 <sup>14</sup>
		267	32		280	130		286	134		285	0
Apr. 10.7	43.652		69.11	9.110		32.13	34.694		54.93	39.742		31.99
20.6	43.901 <sup>249</sup>		68.58 <sup>53</sup>	9.364 <sup>254</sup>		33.87 <sup>174</sup>	34.954 <sup>260</sup>		56.73 <sup>180</sup>	40.010 <sup>268</sup>		31.86 <sup>13</sup>
30.6	44.129 <sup>228</sup>		67.86 <sup>72</sup>	9.592 <sup>228</sup>		35.98 <sup>211</sup>	35.185 <sup>231</sup>		58.92 <sup>219</sup>	40.257 <sup>247</sup>		31.61 <sup>25</sup>
May 10.6	44.332 <sup>203</sup>		66.99 <sup>87</sup>	9.788 <sup>196</sup>		38.36 <sup>238</sup>	35.383 <sup>198</sup>		61.39 <sup>247</sup>	40.482 <sup>225</sup>		31.29 <sup>32</sup>
20.5	44.509 <sup>177</sup>		66.02 <sup>97</sup>	9.949 <sup>161</sup>		40.95 <sup>259</sup>	35.545 <sup>162</sup>		64.06 <sup>267</sup>	40.679 <sup>197</sup>		30.91 <sup>38</sup>
		148	103		124	270		124	279		167	41
30.5	44.657 <sup>115</sup>		64.99 <sup>106</sup>	10.073 <sup>85</sup>		43.65 <sup>272</sup>	35.669 <sup>84</sup>		66.85 <sup>281</sup>	40.846 <sup>135</sup>		30.50 <sup>42</sup>
June 9.5	44.772 <sup>80</sup>		63.93 <sup>106</sup>	10.158 <sup>45</sup>		46.37 <sup>267</sup>	35.753 <sup>41</sup>		69.66 <sup>277</sup>	40.981 <sup>99</sup>		30.08 <sup>42</sup>
19.5	44.852 <sup>46</sup>		62.88 <sup>100</sup>	10.203 <sup>2</sup>		49.04 <sup>253</sup>	35.794 <sup>1</sup>		72.43 <sup>263</sup>	41.080 <sup>60</sup>		29.66 <sup>39</sup>
29.4	44.898 <sup>8</sup>		61.88 <sup>94</sup>	10.205 <sup>39</sup>		51.57 <sup>236</sup>	35.793 <sup>44</sup>		75.06 <sup>244</sup>	41.140 <sup>21</sup>		29.27 <sup>36</sup>
July 9.4	44.906 <sup>29</sup>		60.94 <sup>85</sup>	10.166 <sup>79</sup>		53.93 <sup>211</sup>	35.749 <sup>85</sup>		77.50 <sup>217</sup>	41.161 <sup>18</sup>		28.91 <sup>34</sup>
19.4	44.877		60.09	10.087		56.04	35.664		79.67	41.143		28.57
29.4	44.813 <sup>64</sup>		59.33 <sup>76</sup>	9.970 <sup>117</sup>		57.86 <sup>182</sup>	35.540 <sup>124</sup>		81.56 <sup>189</sup>	41.087 <sup>56</sup>		28.26 <sup>31</sup>
Aug. 8.3	44.717 <sup>96</sup>		58.69 <sup>64</sup>	9.819 <sup>151</sup>		59.34 <sup>148</sup>	35.382 <sup>158</sup>		83.10 <sup>154</sup>	40.995 <sup>92</sup>		27.98 <sup>28</sup>
18.3	44.593 <sup>124</sup>		58.15 <sup>54</sup>	9.640 <sup>179</sup>		60.47 <sup>113</sup>	35.195 <sup>187</sup>		84.26 <sup>116</sup>	40.874 <sup>121</sup>		27.71 <sup>27</sup>
28.3	44.447 <sup>146</sup>		57.72 <sup>43</sup>	9.438 <sup>202</sup>		61.21 <sup>74</sup>	34.983 <sup>212</sup>		85.02 <sup>76</sup>	40.729 <sup>145</sup>		27.46 <sup>25</sup>
		162	31		217	34		225	34		164	24
Sept. 7.2	44.285		57.41	9.221		61.55	34.758		85.36	40.565		27.22
17.2	44.118 <sup>167</sup>		57.24 <sup>17</sup>	8.998 <sup>223</sup>		61.48 <sup>7</sup>	34.526 <sup>232</sup>		85.29 <sup>7</sup>	40.394 <sup>171</sup>		26.99 <sup>23</sup>
27.2	43.955 <sup>163</sup>		57.19 <sup>5</sup>	8.779 <sup>219</sup>		61.01 <sup>47</sup>	34.297 <sup>229</sup>		84.79 <sup>50</sup>	40.225 <sup>169</sup>		26.77 <sup>22</sup>
Oct. 7.2	43.803 <sup>152</sup>		57.28 <sup>9</sup>	8.575 <sup>204</sup>		60.12 <sup>89</sup>	34.083 <sup>214</sup>		83.86 <sup>93</sup>	40.069 <sup>156</sup>		26.58 <sup>19</sup>
17.1	43.674 <sup>129</sup>		57.53 <sup>25</sup>	8.393 <sup>182</sup>		58.82 <sup>130</sup>	33.891 <sup>192</sup>		82.51 <sup>135</sup>	39.934 <sup>135</sup>		26.44 <sup>14</sup>
		98	40		149	169		158	176		103	9
27.1	43.576		57.93	8.244		57.13	33.733		80.76	39.831		26.35
Nov. 6.1	43.518 <sup>58</sup>		58.50 <sup>57</sup>	8.135 <sup>109</sup>		55.09 <sup>204</sup>	33.616 <sup>117</sup>		78.64 <sup>212</sup>	39.768 <sup>63</sup>		26.34 <sup>1</sup>
16.1	43.503 <sup>15</sup>		59.25 <sup>75</sup>	8.074 <sup>61</sup>		52.73 <sup>236</sup>	33.547 <sup>69</sup>		76.19 <sup>245</sup>	39.751 <sup>17</sup>		26.44 <sup>10</sup>
26.0	43.536 <sup>33</sup>		60.16 <sup>91</sup>	8.066 <sup>8</sup>		50.09 <sup>264</sup>	33.531 <sup>16</sup>		73.47 <sup>272</sup>	39.782 <sup>31</sup>		26.67 <sup>23</sup>
Dec. 6.0	43.619 <sup>83</sup>		61.24 <sup>108</sup>	8.112 <sup>46</sup>		47.25 <sup>284</sup>	33.570 <sup>39</sup>		70.54 <sup>293</sup>	39.865 <sup>83</sup>		27.02 <sup>35</sup>
		130	123		99	297		95	306		132	48
16.0	43.749		62.47	8.211		44.28	33.665		67.48	39.997		27.50
25.9	43.923 <sup>174</sup>		63.79 <sup>132</sup>	8.361 <sup>150</sup>		41.27 <sup>301</sup>	33.813 <sup>148</sup>		64.39 <sup>309</sup>	40.176 <sup>179</sup>		28.10 <sup>60</sup>
35.9	44.137 <sup>214</sup>		65.17 <sup>138</sup>	8.558 <sup>197</sup>		38.33 <sup>294</sup>	34.009 <sup>196</sup>		61.37 <sup>302</sup>	40.395 <sup>219</sup>		28.79 <sup>69</sup>
Mean Place	40.999		56.57	6.805		52.31	32.416		75.49	36.950		23.24
Sec δ, Tan δ	1.003		−0.072	1.167		+0.602	1.202		+0.667	1.039		−0.280
D <sub>μ</sub> α, D <sub>μ</sub> α	+0.06		0.00	+0.05		+0.01	+0.04		+0.01	+0.07		0.00
D <sub>μ</sub> δ, D <sub>μ</sub> δ	−0.1		−1.0	−0.1		−1.0	−0.1		−1.0	−0.1		−1.0

**FOR THE UPPER TRANSIT AT WASHINGTON.**





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	<i>b</i> Ophiuchi. Mag. 4.3			<i>σ</i> Ophiuchi. Mag. 4.4			<i>δ</i> Aræ. Mag. 3.8			<i>α</i> Aræ. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	17	21	−24 6	17	22	+ 4 12	17	23	−60 36	17	25	−49 48
	s		"	s		"	s		"	s		"
Jan. 0.9	17.738		3.09	23.449		36.12	35.15		57.78	24.871		41.95
10.9	17.982 <sup>244</sup>		3.29 <sup>20</sup>	23.659 <sup>210</sup>		34.37 <sup>175</sup>	35.54 <sup>39</sup>		55.98 <sup>180</sup>	25.190 <sup>319</sup>		40.68 <sup>127</sup>
20.9	18.258 <sup>276</sup>		3.57 <sup>28</sup>	23.898 <sup>239</sup>		32.70 <sup>167</sup>	36.01 <sup>47</sup>		54.45 <sup>153</sup>	25.557 <sup>367</sup>		39.62 <sup>106</sup>
30.9	18.560 <sup>302</sup>		3.91 <sup>34</sup>	24.162 <sup>264</sup>		31.16 <sup>154</sup>	36.52 <sup>51</sup>		53.22 <sup>123</sup>	25.962 <sup>405</sup>		38.79 <sup>83</sup>
Feb. 9.8	18.879 <sup>319</sup>		4.29 <sup>38</sup>	24.443 <sup>281</sup>		29.82 <sup>134</sup>	37.07 <sup>55</sup>		52.30 <sup>92</sup>	26.393 <sup>431</sup>		38.21 <sup>58</sup>
		330			292	106		58	58		450	35
19.8	19.209		4.67	24.735		28.76	37.65		51.72	26.843		37.86
Mar. 1.8	19.543 <sup>334</sup>		5.03 <sup>36</sup>	25.033 <sup>298</sup>		28.00 <sup>76</sup>	38.24 <sup>59</sup>		51.45 <sup>27</sup>	27.301 <sup>458</sup>		37.74 <sup>12</sup>
		334			298	43		59	5		461	10
11.8	19.877 <sup>334</sup>		5.34 <sup>31</sup>	25.331 <sup>298</sup>		27.57 <sup>8</sup>	38.83 <sup>59</sup>		51.50 <sup>5</sup>	27.762 <sup>461</sup>		37.84 <sup>10</sup>
21.7	20.207 <sup>330</sup>		5.59 <sup>25</sup>	25.626 <sup>295</sup>		27.49 <sup>8</sup>	39.41 <sup>58</sup>		51.86 <sup>36</sup>	28.218 <sup>456</sup>		38.16 <sup>32</sup>
31.7	20.528 <sup>321</sup>		5.79 <sup>20</sup>	25.912 <sup>286</sup>		27.76 <sup>27</sup>	39.98 <sup>57</sup>		52.51 <sup>65</sup>	28.663 <sup>445</sup>		38.67 <sup>51</sup>
		308	14		274	60		55	94		429	70
Apr. 10.7	20.836		5.93	26.186		28.36	40.53		53.45	29.092		39.37
20.6	21.129 <sup>293</sup>		6.01 <sup>8</sup>	26.444 <sup>258</sup>		29.24 <sup>88</sup>	41.05 <sup>52</sup>		54.64 <sup>119</sup>	29.498 <sup>406</sup>		40.23 <sup>86</sup>
30.6	21.403 <sup>274</sup>		6.05 <sup>4</sup>	26.685 <sup>241</sup>		30.38 <sup>114</sup>	41.53 <sup>48</sup>		56.04 <sup>140</sup>	29.878 <sup>380</sup>		41.25 <sup>102</sup>
May 10.6	21.653 <sup>250</sup>		6.07 <sup>2</sup>	26.902 <sup>217</sup>		31.71 <sup>133</sup>	41.96 <sup>43</sup>		57.66 <sup>162</sup>	30.223 <sup>345</sup>		42.43 <sup>118</sup>
20.6	21.876 <sup>223</sup>		6.08 <sup>1</sup>	27.096 <sup>194</sup>		33.18 <sup>147</sup>	42.34 <sup>38</sup>		59.45 <sup>179</sup>	30.530 <sup>307</sup>		43.72 <sup>129</sup>
		194	2		164	156		32	192		262	139
30.5	22.070		6.10	27.260		34.74	42.66		61.37	30.792		45.11
June 9.5	22.228 <sup>158</sup>		6.12 <sup>2</sup>	27.391 <sup>131</sup>		36.33 <sup>159</sup>	42.92 <sup>26</sup>		63.38 <sup>201</sup>	31.004 <sup>212</sup>		46.58 <sup>147</sup>
		120			99			18	205		158	151
19.5	22.348 <sup>80</sup>		6.17 <sup>5</sup>	27.490 <sup>60</sup>		37.90 <sup>157</sup>	43.10 <sup>18</sup>		65.43 <sup>205</sup>	31.162 <sup>100</sup>		48.09 <sup>150</sup>
29.5	22.428 <sup>38</sup>		6.24 <sup>7</sup>	27.550 <sup>22</sup>		39.42 <sup>152</sup>	43.20 <sup>10</sup>		67.47 <sup>204</sup>	31.262 <sup>39</sup>		49.59 <sup>146</sup>
July 9.4	22.466 <sup>5</sup>		6.32 <sup>8</sup>	27.572 <sup>16</sup>		40.84 <sup>142</sup>	43.22 <sup>2</sup>		69.45 <sup>198</sup>	31.301 <sup>21</sup>		51.05 <sup>137</sup>
			8		130		5		185			
19.4	22.461		6.40	27.556		42.14	43.17		71.30	31.280		52.42
29.4	22.415 <sup>46</sup>		6.48 <sup>8</sup>	27.502 <sup>54</sup>		43.28 <sup>114</sup>	43.04 <sup>13</sup>		72.95 <sup>165</sup>	31.201 <sup>79</sup>		53.64 <sup>122</sup>
Aug. 8.3	22.330 <sup>85</sup>		6.54 <sup>6</sup>	27.415 <sup>87</sup>		44.26 <sup>98</sup>	42.85 <sup>19</sup>		74.35 <sup>140</sup>	31.068 <sup>133</sup>		54.69 <sup>105</sup>
		120	1		119			26	110		182	81
18.3	22.210 <sup>148</sup>		6.55 <sup>3</sup>	27.296 <sup>143</sup>		45.06 <sup>59</sup>	42.59 <sup>31</sup>		75.45 <sup>75</sup>	30.886 <sup>222</sup>		55.50 <sup>55</sup>
28.3	22.062 <sup>170</sup>		6.52 <sup>10</sup>	27.153 <sup>163</sup>		45.65 <sup>41</sup>	42.28 <sup>34</sup>		76.20 <sup>86</sup>	30.664 <sup>251</sup>		56.05 <sup>25</sup>
Sept. 7.3	21.892		6.42	26.990		46.06	41.94		76.56	30.413		56.30
17.2	21.712 <sup>180</sup>		6.24 <sup>18</sup>	26.818 <sup>172</sup>		46.26 <sup>20</sup>	41.57 <sup>37</sup>		76.51 <sup>5</sup>	30.148 <sup>265</sup>		56.23 <sup>7</sup>
27.2	21.531 <sup>181</sup>		6.00 <sup>24</sup>	26.645 <sup>173</sup>		46.25 <sup>1</sup>	41.20 <sup>37</sup>		76.05 <sup>46</sup>	29.881 <sup>267</sup>		55.82 <sup>41</sup>
Oct. 7.2	21.361 <sup>170</sup>		5.68 <sup>32</sup>	26.481 <sup>164</sup>		46.02 <sup>23</sup>	40.86 <sup>34</sup>		75.16 <sup>89</sup>	29.628 <sup>253</sup>		55.10 <sup>72</sup>
17.2	21.211 <sup>150</sup>		5.32 <sup>36</sup>	26.334 <sup>147</sup>		45.58 <sup>44</sup>	40.56 <sup>30</sup>		73.90 <sup>126</sup>	29.403 <sup>225</sup>		54.09 <sup>101</sup>
		118	38		119	67		26	161		183	128
27.1	21.093		4.94	26.215		44.91	40.30		72.29	29.220		52.81
Nov. 6.1	21.015 <sup>78</sup>		4.56 <sup>38</sup>	26.131 <sup>84</sup>		44.03 <sup>88</sup>	40.12 <sup>18</sup>		70.40 <sup>189</sup>	29.092 <sup>128</sup>		51.33 <sup>148</sup>
		32			42			10	211		65	163
16.1	20.983 <sup>19</sup>		4.21 <sup>35</sup>	26.089 <sup>4</sup>		42.93 <sup>110</sup>	40.02 <sup>2</sup>		68.29 <sup>224</sup>	29.027 <sup>6</sup>		49.70 <sup>171</sup>
26.0	21.002 <sup>72</sup>		3.92 <sup>29</sup>	26.093 <sup>50</sup>		41.64 <sup>147</sup>	40.00 <sup>8</sup>		66.05 <sup>228</sup>	29.033 <sup>78</sup>		47.99 <sup>173</sup>
Dec. 6.0	21.074 <sup>124</sup>		3.72 <sup>10</sup>	26.143 <sup>99</sup>		40.17 <sup>163</sup>	40.08 <sup>19</sup>		63.77 <sup>224</sup>	29.111 <sup>151</sup>		46.26 <sup>166</sup>
16.0	21.198		3.62	26.242		38.54	40.27		61.53	29.262		44.60
26.0	21.371 <sup>173</sup>		3.63 <sup>1</sup>	26.384 <sup>142</sup>		36.84 <sup>170</sup>	40.53 <sup>26</sup>		59.41 <sup>212</sup>	29.481 <sup>219</sup>		43.04 <sup>156</sup>
35.9	21.588 <sup>217</sup>		3.74 <sup>11</sup>	26.568 <sup>184</sup>		35.09 <sup>175</sup>	40.88 <sup>35</sup>		57.46 <sup>195</sup>	29.763 <sup>282</sup>		41.63 <sup>141</sup>
Mean Place	17.948		0.68	23.753		41.90	36.038		59.05	25.373		42.21
Sec <i>δ</i> , Tan <i>δ</i>	1.096		−0.447	1.003		+0.074	2.038		−1.776	1.550		−1.184
<i>Dψ</i> <i>a</i> , <i>Dω</i> <i>a</i>	+0.07		−0.01	+0.06		0.00	+0.11		−0.02	+0.09		−0.01
<i>Dψ</i> <i>δ</i> , <i>Dω</i> <i>δ</i>	−0.1		−1.0	−0.1		−1.0	−0.1		−1.0	−0.1		−1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time	$\lambda$ Hercules Mag. 4.5		$\lambda$ Scorpi Mag. 1.7		$\beta$ Draconis Mag. 3.9		$\alpha$ Ophiuchi Mag. 2.1	
	Right Ascension	Declina- tion	Right Ascension	Declina- tion	Right Ascension	Declina- tion	Right Ascension	Declina- tion
	17 17	-35 10	17 37	-37 10	17 38	-53 51	17 31	-19 36
Jan. 1.0	18 38	12 57	57 534	40 57	31 159	35 01	4 446	63 50
10.0	18 36	10 28	58 521	40 06	31 355	31 23	4 542	61 51
20.0	18 36	7 53	59 507	39 04	31 559	26 58	4 641	59 21
30.0	18 36	5 45	60 492	38 34	32 163	23 11	4 741	56 21
Feb. 4.0	18 37	3 53	61 476	38 16	32 366	19 41	4 842	53 19
14.0	18 38	2 03	62 459	38 14	32 569	16 54	4 941	50 53
Mar. 1.0	18 39	1 02	63 441	38 11	33 172	14 49	5 041	48 08
11.0	18 41	0 53	64 422	38 32	33 375	12 01	5 141	45 36
21.0	18 40	0 56	65 401	38 52	33 578	9 13	5 241	42 54
31.0	18 40	1 15	66 378	39 5	34 181	6 25	5 341	40 12
Apr. 10.0	18 40	2 21	67 354	40 24	34 384	3 37	5 441	37 30
20.0	18 40	3 11	68 329	41 11	34 587	0 49	5 541	34 48
30.0	18 40	3 56	69 303	41 58	35 189	1 51	5 641	32 06
May 10.0	18 41	4 11	70 276	42 45	35 392	2 53	5 741	29 24
20.0	18 41	4 16	71 248	43 32	35 594	3 55	5 841	26 42
30.0	18 41	4 14	72 219	44 19	36 197	4 57	5 941	23 60
June 9.0	18 42	4 58	73 189	45 06	36 399	5 59	6 041	20 78
19.0	18 42	5 11	74 158	45 53	36 602	6 59	6 141	17 96
29.0	18 42	5 44	75 126	46 40	36 804	7 59	6 241	15 14
July 8.0	18 42	6 01	76 94	47 27	37 007	8 59	6 341	12 32
18.0	18 42	6 06	76 94	48 14	37 209	9 59	6 441	9 50
28.0	18 42	6 06	77 94	49 01	37 412	10 59	6 541	7 08
Aug. 7.0	18 42	6 06	78 94	49 48	37 614	11 59	6 641	4 26
17.0	18 42	6 06	79 94	50 35	37 817	12 59	6 741	1 44
27.0	18 42	6 06	80 94	51 22	38 019	13 59	6 841	0 00
Sept. 6.0	18 42	6 06	81 94	52 09	38 222	14 59	6 941	0 00
16.0	18 42	6 06	82 94	52 56	38 424	15 59	7 041	0 00
26.0	18 42	6 06	83 94	53 43	38 627	16 59	7 141	0 00
Oct. 5.0	18 42	6 06	84 94	54 30	38 829	17 59	7 241	0 00
15.0	18 42	6 06	85 94	55 17	39 032	18 59	7 341	0 00
25.0	18 42	6 06	86 94	56 04	39 234	19 59	7 441	0 00
Nov. 4.0	18 42	6 06	87 94	56 51	39 437	20 59	7 541	0 00
14.0	18 42	6 06	88 94	57 38	39 639	21 59	7 641	0 00
24.0	18 42	6 06	89 94	58 25	39 842	22 59	7 741	0 00
Dec. 3.0	18 42	6 06	90 94	59 12	40 044	23 59	7 841	0 00
13.0	18 42	6 06	91 94	59 59	40 247	24 59	7 941	0 00
23.0	18 42	6 06	92 94	60 46	40 449	25 59	8 041	0 00
31.0	18 42	6 06	93 94	61 33	40 652	26 59	8 141	0 00
Mean Place	18 42	39 57	58 22	28 2	38 228	4 45	4 551	70 14
Sec. 2. Time	1 14	-1 47	1 33	-1 13	1 32	-1 24	1 25	-0 24
Do 1. Do 2	-1 17	1 00	-1 36	-1 07	-1 35	1 02	-1 28	0 00
Do 2. Do 3	-1 17	1 00	-1 36	-1 07	-1 35	1 02	-1 28	-1 00

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Ophiuchi. Mag. 2.9			$\epsilon^1$ Scorpii. Mag. 3.1			$\mu$ Herculis. Mag. 3.5			$\psi$ Draconis. Mag. 4.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 17 39	s	° ' + 4 35	h m 17 41	s	° ' -40 5	h m 17 43	s	° ' +27 45	h m 17 43	s	° ' +72 10
Jan. 1.0	21.976		58.55	46.402		46.89	11.871		59.55	20.03		75.30
10.9	22.168	192	56.83 172	46.664	262	46.02 87	12.049	178	56.77 278	20.26	23	71.83 347
20.9	22.394	226	55.18 165	46.966	302	45.31 71	12.266	217	54.15 262	20.61	35	68.56 327
30.9	22.646	252	53.66 152	47.301	335	44.74 57	12.516	250	51.76 239	21.08	47	65.64 292
Feb. 9.9	22.917	271	52.34 132	47.662	361	44.33 41	12.791	275	49.73 203	21.66	58	63.18 246
		285	105		377	27		293	161		65	191
19.8	23.202		51.29 75	48.039		44.06 15	13.084		48.12 112	22.31		61.27 130
Mar. 1.8	23.495	293	50.54 42	48.428	389	43.91 2	13.392	308	47.00 59	23.02	71	59.97 65
11.8	23.791	296	50.12 6	48.820	392	43.89 8	13.704	312	46.41 6	23.77	75	59.32 4
21.7	24.086	295	50.06 30	49.211	391	43.97 21	14.017	313	46.35 50	24.52	75	59.36 70
31.7	24.376	290	63	49.596	385	31	14.323	306	46.85 99	25.25	73	60.06 133
		280			376			297			69	
Apr. 10.7	24.656		50.99 91	49.972		44.49 40	14.620		47.84 146	25.94		61.39 192
20.7	24.924	268	51.90 119	50.330	358	50	14.901	281	49.30 185	26.56	62	63.31 241
30.6	25.175	251	53.09 138	50.668	338	60	15.160	259	51.15 220	27.12	56	65.72 280
May 10.6	25.407	232	54.47 153	50.981	313	70	15.396	236	53.35 243	27.58	46	68.52 312
20.6	25.613	206	163	51.265	284	78	15.601	205	55.78 261	27.93	35	71.64 332
		179			247			171			24	
30.6	25.792		57.63 167	51.512		47.47 85	15.772	136	58.39 268	28.17		74.96 344
June 9.5	25.939	147	59.30 165	51.719	207	91	15.908	96	61.07 270	28.28	11	78.40 344
19.5	26.051	112	60.95 159	51.880	161	95	16.004	53	63.77 261	28.28	0	81.84 336
29.5	26.126	75	62.54 150	51.993	113	96	16.057	9	66.38 249	28.15	13	85.20 319
July 9.4	26.162	36	137	52.056	63	93	16.066	33	68.87 230	27.91	24	88.39 294
		2			9						36	
19.4	26.160		65.41 123	52.065		85	16.033	75	71.17 205	27.55		91.33 262
29.4	26.118	42	66.64 104	52.023	42	75	15.958	114	73.22 176	27.09	46	93.95 225
Aug. 8.4	26.039	79	67.68 87	51.932	91	62	15.844	148	74.98 145	26.53	56	96.20 183
18.3	25.927	112	68.55 66	51.797	135	45	15.696	178	76.43 109	25.90	63	98.03 137
28.3	25.789	138	47	51.625	172	23	15.518	199	77.52 72	25.21	69	99.40 88
		160			200						75	
Sept. 7.3	25.629		69.68 25	51.425		2	15.319		78.24 34	24.46		100.28 37
17.3	25.457	172	69.93 4	51.207	218	21	15.105	214	78.58 6	23.69	77	100.65 16
27.2	25.281	176	69.97 18	50.984	223	44	14.887	218	78.52 45	22.91	78	100.49 68
Oct. 7.2	25.110	171	69.79 39	50.772	212	66	14.676	211	78.07 85	22.15	76	99.81 120
17.2	24.957	153	62	50.577	195	85	14.479	197	77.22 125	21.41	74	98.61 171
		128			161			171			68	
27.1	24.829		68.78 84	50.416	117	101	14.308	138	75.97 162	20.73		96.90 218
Nov. 6.1	24.732	97	67.94 105	50.299	65	112	14.170	95	74.35 197	20.13	60	94.72 262
16.1	24.676	56	66.89 126	50.234	7	119	14.075	49	72.38 227	19.62	51	92.10 298
26.1	24.664	12	65.63 143	50.227	55	117	14.026	1	70.11 253	19.22	40	89.12 327
Dec. 6.0	24.699	35	159	50.282	116	115	14.027	52	67.58 270	18.95	27	85.85 349
		82									14	
16.0	24.781		62.61 168	50.398		107	14.079		64.88 281	18.81		82.36 357
26.0	24.907	126	60.93 170	50.573	175	96	14.180	101	62.07 281	18.81	0	78.79 354
36.0	25.075	168		50.801	228		14.329	149	59.26 281	18.95	14	75.25
Mean Place	22.313		63.81	46.752		45.73	12.573		66.42	24.658		83.68
Sec $\delta$ , Tan $\delta$	1.003		+0.080	1.307		-0.842	1.130		+0.527	3.270		+3.113
$D_{\psi} a, D_{\omega} a$	+0.06		0.00	+0.08		0.00	+0.05		0.00	-0.02		+0.01
$D_{\psi} \delta, D_{\omega} \delta$	0.0		-1.0	0.0		-1.0	0.0		-1.0	0.0		-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Ophiuchi. Mag. 3.7		89 Herculis. Mag. 5.5		$\xi$ Draconis. Mag. 3.9		35 Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 43 s	° ' " + 2 44 "	h m 17 52 s	° ' " +26 3 "	h m 17 52 s	° ' " +56 52 "	h m 17 53 s	° ' " +76 58 "
Jan. 1.0	43.487	10.43	3.630	38.58	3.596	59.95	3.01	21.45
10.9	43.677 190	8.82 161	3.800 170	35.90 268	3.767 171	56.49 346	3.24 23	18.01 344
20.9	43.901 224	7.27 155	4.009 209	33.36 254	4.010 243	53.22 327	3.64 40	14.75 326
30.9	44.151 250	5.84 143	4.250 241	31.03 233	4.314 304	50.28 294	4.21 57	11.82 293
Feb. 9.9	44.420 269 283	4.59 125 101	4.518 268 288	29.04 199 158	4.671 357 399	47.76 252 199	4.93 72 83	9.32 250 198
19.8	44.703	3.58 72	4.806	27.46 112	5.070	45.77 139	5.76 92	7.34 138
Mar. 1.8	44.995 292	2.86 39	5.108 302	26.34 62	5.498 428	44.38 76	6.68 97	5.96 74
11.8	45.291 296	2.47 7	5.416 308	25.72 8	5.945 447	43.62 7	7.65 100	5.22 7
21.7	45.586 295	2.40 —	5.726 310	25.64 —	6.397 452	43.55 —	8.65 98	5.15 —
31.7	45.877 291 283	2.66 26 59	6.032 306 297	26.09 45 96	6.842 445 428	44.13 58 122	9.63 93	5.74 122
Apr. 10.7	46.160	3.25	6.329	27.05	7.270	45.35	10.56	6.96
20.7	46.430 270	4.11 86	6.613 284	28.45 140	7.669 399	47.15 180	11.41 85	8.76 180
30.6	46.683 258	5.23 112	6.877 264	30.26 181	8.030 361	49.45 230	12.15 74	11.07 231
May 10.6	46.918 235	6.53 130	7.119 242	32.40 214	8.345 315	52.18 273	12.77 62	13.79 272
20.6	47.129 211 184	7.98 145 154	7.332 213 182	34.79 239 267	8.606 261 201	55.24 306 327	13.26 49 31	16.85 306 328
30.6	47.313	9.52	7.514	37.36	8.807	58.51	13.57 15	20.13
June 9.5	47.465 152	11.09 157	7.660 146	40.02 266	8.944 137	61.92 341	13.72 —	23.54 341
19.5	47.583 118	12.65 156	7.766 106	42.69 267	9.014 70	65.36 344	13.71 1	26.98 344
29.5	47.664 81	14.16 151	7.831 65	45.30 261	9.016 2	68.74 338	13.54 17	30.36 338
July 9.4	47.705 41 3	15.58 142 130	7.854 23 21	47.79 249 282	8.950 66 132	71.97 323 299	13.20 34 49	33.59 323 299
19.4	47.708 —	16.88	7.833	50.11	8.818	74.96	12.71	36.58
29.4	47.671 37	18.02 114	7.770 63	52.18 207	8.621 197	77.66 270	12.08 63	39.29 271
Aug. 8.4	47.597 74	19.01 99	7.667 103	53.99 181	8.368 253	80.02 286	11.31 77	41.65 236
18.3	47.490 107	19.83 82	7.529 138	55.48 149	8.065 308	81.97 195	10.45 86	43.60 195
28.3	47.355 135 157	20.45 62 45	7.361 168 191	56.63 115 80	7.719 346 377	83.47 150 103	9.49 96 103	45.10 150 103
Sept. 7.3	47.198	20.90	7.170	57.43	7.342	84.50	8.46	46.13
17.3	47.027 171	21.14 24	6.963 207	57.86 43	6.943 399	85.02 52	7.40 106	46.66 53
27.2	46.852 175	21.20 6	6.751 212	57.90 4	6.538 405	85.02 0	6.32 108	46.66 0
Oct. 7.2	46.684 168	21.04 16	6.543 208	57.55 35	6.139 399	84.50 52	5.25 107	46.15 51
17.2	46.529 155 129	20.70 34 55	6.348 195 170	56.81 74 112	5.757 382 348	83.47 103 154	4.21 104 97	45.12 103 153
27.1	46.400	20.15	6.178	55.69	5.409	81.93	3.24	43.59
Nov. 6.1	46.301 99	19.38 77	6.039 139	54.20 149	5.105 304	79.90 203	2.36 88	41.58 201
16.1	46.243 58	18.42 96	5.940 99	52.38 182	4.857 248	77.43 247	1.62 74	39.12 246
26.1	46.229 14	17.26 116	5.887 53	50.24 214	4.675 182	74.59 284	1.00 62	36.29 283
Dec. 6.0	46.262 33 79	15.94 132 146	5.882 5 46	47.86 238 258	4.565 110 32	71.42 317 338	0.55 45 27	33.14 315 337
16.0	46.341	14.48	5.928	45.28	4.533	68.04	0.28	29.77
26.0	46.465 124	12.92 156	6.022 94	42.59 269	4.580 47	64.53 351	0.20 8	26.28 349
36.0	46.630 165	11.32 160	6.163 141	39.88 271	4.703 123	61.03 350	0.30 10	22.79 340
Mean Place	43.813	15.38	4.310	44.75	5.684	67.24	9.799	28.71
Sec $\delta$ , Tan $\delta$	1.001	+0.048	1.113	+0.489	1.830	+1.533	4.437	+4.323
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	0.00	+0.05	0.00	+0.02	0.00	-0.05	+0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Herculis. Mag. 4.0		$\nu$ Ophiuchi. Mag. 3.5		$\xi$ Herculis. Mag. 3.8		$\gamma$ Draconis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 53 s	° ' +37 15 "	h m 17 54 s	° ' - 9 45 "	h m 17 54 s	° ' +29 15 "	h m 17 54 s	° ' +51 29 "
Jan. 1.0	23.386	32.31	27.130	55.65	31.620	15.75	39.040	46.42
10.9	23.551 <sup>165</sup>	29.24 <sup>307</sup>	27.322 <sup>192</sup>	56.53 <sup>88</sup>	31.786 <sup>166</sup>	12.95 <sup>280</sup>	39.204 <sup>164</sup>	43.03 <sup>339</sup>
20.9	23.762 <sup>211</sup>	26.33 <sup>291</sup>	27.549 <sup>227</sup>	57.40 <sup>87</sup>	31.993 <sup>207</sup>	10.29 <sup>266</sup>	39.429 <sup>225</sup>	39.82 <sup>321</sup>
30.9	24.013 <sup>251</sup>	23.70 <sup>263</sup>	27.802 <sup>253</sup>	58.23 <sup>83</sup>	32.234 <sup>241</sup>	7.86 <sup>243</sup>	39.708 <sup>279</sup>	36.91 <sup>291</sup>
Feb. 9.9	24.294 <sup>281</sup>	21.43 <sup>227</sup>	28.075 <sup>273</sup>	58.96 <sup>73</sup>	32.504 <sup>270</sup>	5.78 <sup>208</sup>	40.032 <sup>324</sup>	34.42 <sup>249</sup>
19.8	24.601 <sup>307</sup>	19.63 <sup>180</sup>	28.363 <sup>288</sup>	59.56 <sup>60</sup>	32.794 <sup>280</sup>	4.12 <sup>166</sup>	40.392 <sup>360</sup>	32.44 <sup>198</sup>
Mar. 1.8	24.925 <sup>324</sup>	18.36 <sup>127</sup>	28.661 <sup>298</sup>	59.99 <sup>43</sup>	33.099 <sup>305</sup>	2.94 <sup>118</sup>	40.778 <sup>386</sup>	31.04 <sup>140</sup>
11.8	25.259 <sup>334</sup>	17.67 <sup>69</sup>	28.964 <sup>303</sup>	60.22 <sup>23</sup>	33.413 <sup>314</sup>	2.29 <sup>65</sup>	41.179 <sup>401</sup>	30.27 <sup>77</sup>
21.8	25.596 <sup>337</sup>	17.57 <sup>10</sup>	29.268 <sup>304</sup>	60.25 <sup>3</sup>	33.729 <sup>316</sup>	2.20 <sup>9</sup>	41.585 <sup>406</sup>	30.16 <sup>11</sup>
31.7	25.929 <sup>833</sup>	18.08 <sup>51</sup>	29.570 <sup>302</sup>	60.06 <sup>19</sup>	34.042 <sup>313</sup>	2.65 <sup>45</sup>	41.986 <sup>401</sup>	30.71 <sup>55</sup>
Apr. 10.7	26.251 <sup>822</sup>	19.15 <sup>107</sup>	29.865 <sup>295</sup>	59.68 <sup>38</sup>	34.344 <sup>302</sup>	3.63 <sup>98</sup>	42.373 <sup>387</sup>	31.87 <sup>116</sup>
20.7	26.556 <sup>305</sup>	20.74 <sup>159</sup>	30.150 <sup>285</sup>	59.13 <sup>55</sup>	34.634 <sup>290</sup>	5.08 <sup>145</sup>	42.735 <sup>362</sup>	33.60 <sup>173</sup>
30.6	26.840 <sup>284</sup>	22.79 <sup>205</sup>	30.422 <sup>272</sup>	58.42 <sup>71</sup>	34.905 <sup>271</sup>	6.95 <sup>187</sup>	43.068 <sup>333</sup>	35.84 <sup>224</sup>
May 10.6	27.094 <sup>254</sup>	25.20 <sup>241</sup>	30.674 <sup>252</sup>	57.60 <sup>82</sup>	35.151 <sup>246</sup>	9.17 <sup>222</sup>	43.361 <sup>293</sup>	38.50 <sup>266</sup>
20.6	27.316 <sup>222</sup>	27.92 <sup>272</sup>	30.905 <sup>231</sup>	56.71 <sup>89</sup>	35.367 <sup>216</sup>	11.67 <sup>250</sup>	43.608 <sup>247</sup>	41.48 <sup>298</sup>
30.6	27.501 <sup>185</sup>	30.83 <sup>291</sup>	31.108 <sup>203</sup>	55.79 <sup>92</sup>	35.551 <sup>184</sup>	14.34 <sup>267</sup>	43.804 <sup>196</sup>	44.69 <sup>321</sup>
June 9.5	27.643 <sup>142</sup>	33.87 <sup>304</sup>	31.281 <sup>173</sup>	54.86 <sup>93</sup>	35.698 <sup>147</sup>	17.11 <sup>277</sup>	43.944 <sup>140</sup>	48.03 <sup>334</sup>
19.5	27.741 <sup>98</sup>	36.91 <sup>304</sup>	31.421 <sup>140</sup>	53.96 <sup>90</sup>	35.804 <sup>106</sup>	19.91 <sup>280</sup>	44.027 <sup>83</sup>	51.40 <sup>337</sup>
29.5	27.792 <sup>51</sup>	39.91 <sup>300</sup>	31.521 <sup>100</sup>	53.11 <sup>85</sup>	35.868 <sup>64</sup>	22.65 <sup>274</sup>	44.050 <sup>23</sup>	54.71 <sup>331</sup>
July 9.4	27.794 <sup>2</sup>	42.78 <sup>287</sup>	31.582 <sup>61</sup>	52.33 <sup>78</sup>	35.889 <sup>21</sup>	25.27 <sup>262</sup>	44.012 <sup>38</sup>	57.89 <sup>318</sup>
19.4	27.749 <sup>45</sup>	45.43 <sup>265</sup>	31.601 <sup>19</sup>	51.65 <sup>68</sup>	35.864 <sup>25</sup>	27.70 <sup>243</sup>	43.914 <sup>98</sup>	60.85 <sup>296</sup>
29.4	27.658 <sup>91</sup>	47.84 <sup>241</sup>	31.579 <sup>22</sup>	51.05 <sup>60</sup>	35.796 <sup>68</sup>	29.89 <sup>219</sup>	43.761 <sup>153</sup>	63.52 <sup>267</sup>
Aug. 8.4	27.524 <sup>134</sup>	49.92 <sup>208</sup>	31.518 <sup>61</sup>	50.55 <sup>50</sup>	35.688 <sup>108</sup>	31.80 <sup>191</sup>	43.555 <sup>206</sup>	65.85 <sup>233</sup>
18.3	27.351 <sup>173</sup>	51.65 <sup>173</sup>	31.422 <sup>96</sup>	50.13 <sup>42</sup>	35.544 <sup>144</sup>	33.38 <sup>158</sup>	43.303 <sup>252</sup>	67.79 <sup>194</sup>
28.3	27.145 <sup>206</sup>	53.00 <sup>135</sup>	31.294 <sup>128</sup>	49.80 <sup>33</sup>	35.368 <sup>176</sup>	34.61 <sup>123</sup>	43.014 <sup>289</sup>	69.29 <sup>150</sup>
Sept. 7.3	26.915 <sup>230</sup>	53.93 <sup>93</sup>	31.144 <sup>150</sup>	49.57 <sup>23</sup>	35.168 <sup>200</sup>	35.47 <sup>86</sup>	42.694 <sup>320</sup>	70.33 <sup>104</sup>
17.3	26.669 <sup>246</sup>	54.42 <sup>49</sup>	30.977 <sup>167</sup>	49.40 <sup>17</sup>	34.952 <sup>216</sup>	35.94 <sup>47</sup>	42.355 <sup>339</sup>	70.88 <sup>55</sup>
27.2	26.417 <sup>252</sup>	54.46 <sup>4</sup>	30.804 <sup>173</sup>	49.30 <sup>10</sup>	34.730 <sup>222</sup>	35.98 <sup>4</sup>	42.008 <sup>347</sup>	70.92 <sup>4</sup>
Oct. 7.2	26.168 <sup>249</sup>	54.05 <sup>41</sup>	30.636 <sup>168</sup>	49.29 <sup>1</sup>	34.512 <sup>218</sup>	35.63 <sup>35</sup>	41.665 <sup>343</sup>	70.45 <sup>47</sup>
17.2	25.933 <sup>235</sup>	53.18 <sup>87</sup>	30.481 <sup>155</sup>	49.36 <sup>7</sup>	34.308 <sup>204</sup>	34.88 <sup>75</sup>	41.340 <sup>325</sup>	69.47 <sup>98</sup>
27.1	25.725 <sup>208</sup>	51.87 <sup>131</sup>	30.350 <sup>131</sup>	49.52 <sup>16</sup>	34.127 <sup>181</sup>	33.71 <sup>117</sup>	41.044 <sup>296</sup>	68.00 <sup>147</sup>
Nov. 6.1	25.551 <sup>174</sup>	50.13 <sup>174</sup>	30.251 <sup>99</sup>	49.79 <sup>27</sup>	33.979 <sup>148</sup>	32.16 <sup>155</sup>	40.787 <sup>257</sup>	66.05 <sup>195</sup>
16.1	25.419 <sup>132</sup>	47.99 <sup>214</sup>	30.192 <sup>59</sup>	50.15 <sup>36</sup>	33.871 <sup>108</sup>	30.26 <sup>190</sup>	40.581 <sup>206</sup>	63.68 <sup>237</sup>
26.1	25.336 <sup>83</sup>	45.51 <sup>248</sup>	30.177 <sup>15</sup>	50.63 <sup>48</sup>	33.809 <sup>62</sup>	28.02 <sup>224</sup>	40.434 <sup>147</sup>	60.91 <sup>277</sup>
Dec. 6.0	25.306 <sup>30</sup>	42.75 <sup>276</sup>	30.209 <sup>32</sup>	51.23 <sup>60</sup>	33.796 <sup>13</sup>	25.53 <sup>249</sup>	40.351 <sup>83</sup>	57.83 <sup>308</sup>
16.0	25.331 <sup>25</sup>	39.78 <sup>297</sup>	30.288 <sup>79</sup>	51.94 <sup>71</sup>	33.834 <sup>38</sup>	22.84 <sup>269</sup>	40.336 <sup>15</sup>	54.53 <sup>330</sup>
26.0	25.410 <sup>79</sup>	36.68 <sup>310</sup>	30.413 <sup>125</sup>	52.72 <sup>78</sup>	33.923 <sup>89</sup>	20.03 <sup>281</sup>	40.391 <sup>55</sup>	51.10 <sup>343</sup>
36.0	25.543 <sup>133</sup>	33.58 <sup>310</sup>	30.578 <sup>165</sup>	53.57 <sup>85</sup>	34.059 <sup>136</sup>	17.20 <sup>283</sup>	40.512 <sup>121</sup>	47.66 <sup>344</sup>
Mean Place	24.377	38.91	27.394	51.93	32.377	21.90	40.717	53.36
Sec $\delta$ , Tan $\delta$	1.257	+0.761	1.015	-0.172	1.146	+0.560	1.606	+1.257
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.04	0.00	+0.07	0.00	+0.05	0.00	+0.03	0.00
$D_{\psi} \delta$ , $D_{\omega} \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	67 Ophiuchi. Mag. 3.9			θ Arct. Mag. 3.9			γ Sagittarii. Mag. 3.1			70 Ophiuchi. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	17	56	+ 2 55	18	0	-50 5	18	0	-30 25	18	1	+ 2 30
	s		"	s		"	s		"	s		"
Jan. 1.0	28.956		60.11	9.617		55.83	28.202		36.85	15.211		59.50
10.9	29.136	180	58.53 158	9.890	273	54.29 154	28.418	216	36.45 40	15.387	176	57.93 157
20.9	29.348	212	56.99 154	10.216	326	52.90 139	28.673	255	36.13 32	15.596	209	56.40 153
30.9	29.587	239	55.58 141	10.585	369	51.70 120	28.959	286	35.90 23	15.833	237	54.99 141
Feb. 9.9	29.849	262	54.35 123	10.989	404	50.69 101	29.269	310	35.71 19	16.092	259	53.76 123
	277		100	428		79	328		14	275		101
19.8	30.126		53.35 70	11.417		49.90 58	29.597		35.57 11	16.367		52.75 72
Mar. 1.8	30.414	288	52.65 38	11.863	446	49.32 38	29.937	340	35.46 10	16.654	287	52.03 41
11.8	30.707	293	52.27 6	12.319	456	48.94 15	30.283	346	35.36 8	16.947	293	51.62 7
21.8	31.002	295	52.21 29	12.779	460	48.79 6	30.632	349	35.28 6	17.243	296	51.55 57
31.7	31.295	293	52.50 61	13.235	456	48.85 26	30.979	347	35.21 6	17.537	294	51.81 57
	287			446			341			288		
Apr. 10.7	31.582		53.11 89	13.681		49.11 45	31.320		35.15 5	17.825		52.38 85
20.7	31.858	276	54.00 115	14.113	432	49.56 65	31.651	331	35.10 1	18.104	279	53.23 111
30.6	32.120	262	55.15 134	14.523	410	50.21 82	31.965	314	35.09 3	18.368	264	54.34 130
May 10.6	32.364	244	56.49 149	14.906	383	51.03 100	32.261	296	35.12 9	18.615	247	55.64 146
20.6	32.585	221	57.98 158	15.253	347	52.03 117	32.533	272	35.21 15	18.841	226	57.10 154
	195			307			241			198		
30.6	32.780		59.56 162	15.560		53.20 129	32.774		35.36 24	19.039		58.64 158
June 9.5	32.943	163	61.18 162	15.819	259	54.49 138	32.981	207	35.60 29	19.207	168	60.22 158
19.5	33.072	129	62.80 156	16.026	207	55.87 145	33.148	167	35.89 35	19.342	135	61.80 153
29.5	33.165	93	64.36 146	16.174	148	57.32 148	33.272	124	36.24 39	19.440	98	63.33 143
July 9.5	33.217	52	65.82 135	16.260	86	58.80 145	33.350	78	36.63 43	19.497	57	64.76 132
	13			24			31			17		
19.4	33.230		67.17 119	16.284		60.25 138	33.381		37.06 44	19.514		66.08 116
29.4	33.202	28	68.36 104	16.246	38	61.63 125	33.364	17	37.50 41	19.491	23	67.24 100
Aug. 8.4	33.135	67	69.40 86	16.147	99	62.88 106	33.301	63	37.91 37	19.429	62	68.24 83
18.3	33.035	100	70.26 67	15.993	154	63.94 84	33.197	104	38.28 29	19.334	95	69.07 64
28.3	32.904	131	70.93 48	15.793	200	64.78 57	33.057	140	38.57 18	19.206	128	69.71 46
	153			236			170			150		
Sept. 7.3	32.751		71.41 29	15.557		65.35 27	32.887		38.75 6	19.056		70.17 26
17.3	32.581	170	71.70 9	15.294	263	65.62 5	32.700	187	38.81 6	18.888	168	70.43 7
27.2	32.407	174	71.79 11	15.022	272	65.57 40	32.503	197	38.75 21	18.713	175	70.50 14
Oct. 7.2	32.235	172	71.68 33	14.753	269	64.46 71	32.310	193	38.54 33	18.541	172	70.36 33
17.2	32.077	158	71.35 52	14.505	248	63.46 100	32.133	177	38.21 44	18.383	158	70.03 53
	137			215			151			138		
27.2	31.940		70.83 73	14.290	168	63.46 128	31.982	115	37.77 54	18.245	107	69.50 74
Nov. 6.1	31.835	105	70.10 93	14.122	110	62.18 148	31.867	70	37.23 59	18.138	70	68.76 93
16.1	31.768	67	69.17 113	14.012	43	60.70 165	31.797	21	36.64 63	18.068	28	67.83 112
26.1	31.744	24	68.04 129	13.969	26	59.05 172	31.776	33	36.01 58	18.040	17	66.71 128
Dec. 6.0	31.765	21	66.75 143	13.995	99	57.33 175	31.809	86	35.39 46	18.057	63	65.43 142
	67											
16.0	31.832		65.32 153	14.094		55.58 172	31.895		34.81 53	18.120		64.01 152
26.0	31.943	111	63.79 158	14.261	167	53.86 162	32.034	139	34.28 46	18.227	107	62.49 156
36.0	32.096	153	62.21	14.494	233		32.219	185		18.378	151	60.93
Mean Place	29.302		64.66	10.166		54.79	28.482		34.56	15.559		63.87
Sec δ, Tan δ	1.001		+0.051	1.559		-1.196	1.160		-0.587	1.001		+0.044
Dψ α, Dω α	+0.06		0.00	+0.09		0.00	+0.08		0.00	+0.06		0.00
Dψ δ, Dω δ	0.0		-1.0	0.0		-1.0	0.0		-1.0	0.0		-1.0



3

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sagittarii. Mag. 2.0		109 Herculis. Mag. 3.9		α Telescopii. Mag. 3.8		χ Draconis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 18 s	° ' " -34 25 "	h m 18 20 s	° ' " +21 43 "	h m 18 20 s	° ' " -46 0 "	h m 18 22 s	° ' " +72 41 "
Jan. 1.0	39.439	31.95	9.015	47.38	48.699	57.68	28.34	45.44
11.0	39.643 204	31.23 72	9.158 143	44.90 248	48.928 229	56.24 144	28.45 11	41.94 350
20.9	39.889 246	30.56 67	9.341 183	42.52 238	49.207 279	54.91 133	28.70 25	38.54 340
30.9	40.169 280	29.97 59	9.557 216	40.33 219	49.529 322	53.72 119	29.08 38	35.39 315
Feb. 9.9	40.477 308	29.45 52	9.801 244	38.40 193	49.886 357	52.66 106	29.57 49	32.61 278
	329	45	267	157	382	90	60	231
19.9	40.806	29.00	10.068	36.83	50.268	51.76	30.17	30.30
Mar. 1.8	41.152 346	28.61 39	10.351 283	35.68 115	50.671 403	51.03 73	30.85 68	28.54 176
11.8	41.508 356	28.26 35	10.646 295	34.99 69	51.087 416	50.45 58	31.58 73	27.40 114
21.8	41.869 361	27.97 29	10.948 302	34.80 19	51.510 423	50.05 40	32.35 77	26.94 46
31.7	42.232 363	27.74 23	11.251 303	35.11 31	51.935 425	49.82 23	33.12 77	27.14 20
	359	18	300	78	421	8	75	85
Apr. 10.7	42.591	27.56	11.551	35.89	52.356	49.74	33.87	27.99
20.7	42.942 351	27.44 12	11.843 292	37.12 123	52.768 412	49.85 11	34.58 71	29.46 147
30.7	43.281 339	27.40 4	12.122 279	38.75 163	53.163 395	50.14 29	35.23 65	31.49 203
May 10.6	43.602 321	27.44 4	12.381 259	40.69 194	53.538 375	50.59 45	35.79 56	33.99 250
20.6	43.899 297	27.58 14	12.617 236	42.93 224	53.884 346	51.23 64	36.26 47	36.87 288
	267	25	208	240	310	80	36	320
30.6	44.166	27.83	12.825	45.33	54.194	52.03	36.62	40.07
June 9.6	44.398 232	28.17 34	13.000 175	47.84 251	54.463 269	52.97 94	36.86 24	43.45 338
19.5	44.591 193	28.61 44	13.138 138	50.41 257	54.685 222	54.04 107	36.97 11	46.94 349
29.5	44.739 148	29.14 53	13.236 98	52.93 252	54.853 168	55.23 119	36.96 1	50.44 350
July 9.5	44.838 99	29.74 60	13.292 56	55.36 243	54.964 111	56.47 124	36.83 13	53.85 341
	50	64	12	229	52	126	25	325
19.4	44.888	30.38	13.304	57.65	55.016	57.73	36.58	57.10
29.4	44.887 1	31.04 66	13.273 31	59.72 207	55.008 8	58.98 125	36.19 39	60.11 301
Aug. 8.4	44.836 51	31.68 64	13.200 73	61.57 185	54.942 66	60.14 116	35.71 48	62.81 270
18.4	44.739 97	32.26 58	13.089 111	63.13 156	54.823 119	61.18 104	35.14 57	65.16 235
28.3	44.602 137	32.76 50	12.946 143	64.38 125	54.655 168	62.06 88	34.48 66	67.08 192
	170	38	172	95	206	66	72	147
Sept. 7.3	44.432	33.14	12.774	65.33	54.449	62.72	33.76	68.55
17.3	44.239 193	33.36 22	12.585 189	65.93 60	54.216 233	63.13 41	33.00 76	69.53 98
27.3	44.035 204	33.42 6	12.386 199	66.17 24	53.967 249	63.26 13	32.20 80	70.00 47
Oct. 7.2	43.830 205	33.31 11	12.185 201	66.06 11	53.718 249	63.10 16	31.40 80	69.94 6
17.2	43.637 193	33.01 30	11.994 191	65.59 47	53.481 237	62.65 45	30.62 78	69.34 60
	169	46	171	84	208	74	75	112
27.2	43.468	32.55	11.823	64.75	53.273	61.91	29.87	68.22
Nov. 6.1	43.333 135	31.95 60	11.678 145	63.57 118	53.104 169	60.92 99	29.18 69	66.58 164
16.1	43.242 91	31.22 73	11.569 109	62.05 152	52.985 119	59.71 121	28.57 61	64.45 213
26.1	43.201 41	30.42 80	11.501 68	60.24 181	52.923 62	58.35 136	28.07 50	61.89 256
Dec. 6.1	43.214 13	29.58 84	11.478 23	58.16 208	52.926 3	56.88 147	27.69 38	58.95 294
	67	85	24	227	67	153	27	324
16.0	43.281	28.73	11.502	55.89	52.993	55.35	27.42	55.71
26.0	43.402 121	27.90 83	11.572 70	53.47 242	53.123 130	53.81 154	27.29 13	52.28 343
36.0	43.574 172	27.11 79	11.688 116	51.00 247	53.315 192	52.33 148	27.32 3	48.77 351
Mean Place	39.755	29.56	9.641	51.57	49.165	55.68	33.352	49.41
Sec δ, Tan δ	1.212	-0.685	1.076	+0.399	1.440	-1.036	3.362	+3.210
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.08	0.00	+0.05	0.00	+0.09	+0.01	-0.02	-0.02
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Sagittarii. Mag. 2.9			c Serpentis. Mag. 5.4			1 Aquilæ. Mag. 4.1			ζ Pavonis. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	18	22	-25 28	18	25	- 2 2	18	30	- 8 18	18	33	-71 29
	s		"	s		"	s		"	s		"
Jan. 1.0	50.642		10.44	21.467		27.25	41.128		14.28	18.54		65.91
11.0	50.826	184	10.24 20	21.623	156	28.46 121	41.285	157	15.10 82	18.91	37	63.14 277
20.9	51.049	223	10.08 16	21.815	192	29.65 119	41.476	191	15.91 81	19.39	48	60.51 263
30.9	51.303	254	9.94 14	22.035	220	30.74 109	41.698	222	16.67 76	19.98	59	58.09 242
Feb. 9.9	51.581	278	9.81 13	22.281	246	31.70 96	41.944	246	17.32 65	20.66	68	55.94 215
		302	9.81 14		263	31.70 76		267	17.32 51		74	55.94 185
19.9	51.883		9.67	22.544		32.46	42.211		17.83	21.40		54.09
Mar. 1.8	52.198	315	9.50 17	22.822	278	32.98 52	42.492	281	18.15 32	22.20	80	52.59 150
11.8	52.523	325	9.30 20	23.110	288	33.25 27	42.783	291	18.27 12	23.04	84	51.46 113
21.8	52.854	331	9.05 25	23.403	293	33.22 3	43.081	298	18.16 11	23.91	87	50.70 76
31.7	53.186	332	8.76 29	23.700	297	32.91 31	43.382	301	17.83 33	24.78	87	50.33 37
		330	8.76 33		295	32.91 61		300	17.83 54		86	50.33 0
Apr. 10.7	53.516		8.43	23.995		32.30	43.682		17.29	25.64		50.33
20.7	53.840	324	8.08 35	24.285	290	31.47 83	43.978	296	16.55 74	26.49	85	50.73 40
30.7	54.153	313	7.73 35	24.564	279	30.40 107	44.265	287	15.66 89	27.31	82	51.50 77
May 10.6	54.449	296	7.40 33	24.828	264	29.18 122	44.538	273	14.65 101	28.07	76	52.63 113
20.6	54.725	276	7.10 30	25.073	245	27.83 135	44.792	254	13.55 110	28.77	70	54.08 145
		250	7.10 24		220	27.83 143		231	13.55 114		61	54.08 175
30.6	54.975		6.86	25.293		26.40	45.023		12.41	29.38		55.83
June 9.6	55.193	218	6.68 18	25.485	192	24.95 145	45.225	202	11.28 113	29.90	52	57.83 200
19.5	55.375	182	6.59 9	25.645	160	23.51 144	45.394	169	10.17 111	30.32	42	60.04 221
29.5	55.518	143	6.58 1	25.767	122	22.12 139	45.526	132	9.13 104	30.63	31	62.39 235
July 9.5	55.617	99	6.66 8	25.850	83	20.86 126	45.619	93	8.18 95	30.81	18	64.82 243
		51	6.66 13		41	20.86 119		50	8.18 85		6	64.82 243
19.4	55.668		6.79	25.891		19.67	45.669		7.33	30.87		67.25
29.4	55.672	4	6.98 19	25.890	1	18.62 105	45.676	7	6.61 72	30.81	6	69.62 237
Aug. 8.4	55.632	40	7.20 22	25.847	43	17.73 89	45.641	35	6.01 60	30.62	19	71.82 220
18.4	55.549	83	7.43 23	25.768	79	16.98 75	45.567	74	5.52 49	30.30	32	73.80 198
28.3	55.428	121	7.65 22	25.654	114	16.40 58	45.458	109	5.15 37	29.90	40	75.47 167
		151	7.65 17		141	16.40 44		136	5.15 25		49	75.47 120
Sept. 7.3	55.277		7.82	25.513		15.96	45.322		4.90	29.41		76.76
17.3	55.102	175	7.94 12	25.353	160	15.69 27	45.163	159	4.74 16	28.86	55	77.61 85
27.3	54.917	185	7.99 5	25.183	170	15.56 13	44.993	170	4.68 6	28.27	59	77.99 38
Oct. 7.2	54.731	186	7.95 4	25.010	173	15.60 4	44.821	172	4.71 3	27.66	61	77.87 12
17.2	54.555	176	7.82 13	24.847	163	15.78 18	44.658	163	4.82 11	27.08	58	77.23 64
		154	7.82 22		146	15.78 34		147	4.82 22		54	77.23 114
27.2	54.401		7.60	24.701		16.12	44.511		5.04	26.54		76.09
Nov. 6.1	54.277	124	7.33 27	24.583	118	16.63 51	44.392	119	5.35 31	26.07	47	74.48 161
16.1	54.192	85	7.01 32	24.499	84	17.28 65	44.307	85	5.76 41	25.70	37	72.47 201
26.1	54.152	40	6.67 34	24.457	42	18.09 81	44.261	46	6.27 51	25.46	24	70.13 234
Dec. 6.1	54.162	10	6.34 33	24.457	0	19.03 94	44.260	1	6.88 61	25.33	13	67.51 262
		60	6.34 32		43	19.03 107		43	6.88 71		1	67.51 277
16.0	54.222		6.02	24.500		20.10	44.303		7.59	25.34		64.74
26.0	54.331	109	5.74 28	24.588	88	21.25 115	44.390	87	8.36 77	25.48	14	61.89 285
36.0	54.486	155	5.51 23	24.717	129	22.46 121	44.520	130	9.17 81	25.77	29	59.06 283
Mean Place	50.911		7.64	21.795		23.78	41.420		11.05	20.434		64.20
Sec δ, Tan δ	1.108		-0.476	1.001		-0.036	1.011		-0.146	3.152		-2.989
Dψ α, Dω α	+0.07		0.00	+0.06		0.00	+0.06		0.00	+0.14		+0.03
Dψ δ, Dω δ	0.0		-1.0	0.0		-1.0	+0.1		-1.0	+0.1		-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Lyrae. (Vega.) Mag. 0.1		$\epsilon$ Aquilae. Mag. 4.7		$\phi$ Sagittarii. Mag. 3.3		$\eta$ Herculis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 34 s	° ' +38 42 "	h m 18 37 s	° ' - 9 7 "	h m 18 40 s	° ' -27 4 "	h m 18 42 s	° ' +20 27 "
Jan. 1.0	6.597	17.40	43.529	61.76	27.989	40.73	4.710	54.69
11.0	6.713 116	14.34 306	43.680 151	62.51 75	28.157 168	40.34 39	4.832 122	52.33 236
20.9	6.879 166	11.36 298	43.865 185	63.24 73	28.365 208	39.98 36	4.993 161	50.02 231
30.9	7.088 209	8.59 277	44.082 217	63.90 66	28.605 240	39.64 34	5.187 194	47.88 214
Feb. 9.9	7.336 248	6.14 245	44.323 241	64.48 58	28.875 270	39.30 34	5.413 226	45.98 190
	280	205	263	44	291	34	251	158
19.9	7.616	4.09	44.586	64.92	29.166	38.96	5.664	44.40
Mar. 1.8	7.922 306	2.54 155	44.864 278	65.17 25	29.476 310	38.60 36	5.933 269	43.22 118
11.8	8.246 324	1.54 100	45.154 290	65.23 6	29.798 322	38.22 38	6.218 285	42.48 74
21.8	8.582 336	1.14 40	45.451 297	65.07 16	30.130 332	37.80 42	6.514 296	42.21 27
31.8	8.924 342	1.34 20	45.753 302	64.71 36	30.466 336	37.35 45	6.815 301	42.43 22
	339	79	302	57	336	46	301	70
Apr. 10.7	9.263	2.13	46.055	64.14	30.802	36.89	7.116	43.13
20.7	9.594 331	3.47 134	46.353 298	63.38 76	31.135 333	36.42 47	7.413 297	44.28 115
30.7	9.909 315	5.31 184	46.644 291	62.47 91	31.461 326	35.97 45	7.701 288	45.82 154
May 10.6	10.201 292	7.59 228	46.922 278	61.45 102	31.771 310	35.56 41	7.974 273	47.69 187
20.6	10.464 263	10.22 263	47.181 259	60.35 110	32.063 292	35.20 36	8.225 251	49.85 216
	229	289	237	113	268	28	227	236
30.6	10.693	13.11	47.418	59.22	32.331	34.92	8.452	52.21
June 9.6	10.883 190	16.19 308	47.627 209	58.09 113	32.569 238	34.74 18	8.646 194	54.69 248
19.5	11.027 144	19.35 316	47.804 177	56.99 110	32.770 201	34.65 9	8.805 159	57.23 254
29.5	11.124 97	22.52 317	47.943 139	55.97 102	32.931 161	34.67 2	8.925 120	59.76 253
July 9.5	11.170 46	25.61 309	48.043 100	55.04 93	33.047 116	34.78 11	9.003 78	62.21 245
	4	294	57	82	69	21	34	232
19.5	11.166	28.55	48.100	54.22	33.116	34.99	9.037	64.53
29.4	11.112 54	31.29 274	48.114 14	53.52 70	33.138 22	35.26 27	9.027 10	66.66 213
Aug. 8.4	11.010 102	33.75 246	48.085 29	52.93 59	33.112 26	35.57 31	8.974 53	68.58 192
18.4	10.863 147	35.88 213	48.016 69	52.47 46	33.041 71	35.91 34	8.882 92	70.23 165
28.3	10.679 184	37.66 178	47.911 105	52.12 35	32.930 111	36.24 33	8.753 129	71.60 137
	218	137	133	24	144	28	158	105
Sept. 7.3	10.461	39.03	47.778	51.88	32.786	36.52	8.595	72.65
17.3	10.221 240	39.98 95	47.623 155	51.73 15	32.615 171	36.74 22	8.415 180	73.37 72
27.3	9.967 254	40.48 50	47.453 170	51.67 6	32.430 185	36.88 14	8.221 194	73.76 39
Oct. 7.2	9.709 258	40.52 4	47.281 172	51.70 3	32.241 189	36.92 4	8.023 198	73.81 5
17.2	9.458 251	40.09 43	47.116 165	51.80 10	32.059 182	36.85 7	7.831 192	73.49 32
	233	89	149	19	164	17	177	66
27.2	9.225	39.20	46.967	51.99	31.895	36.68	7.654	72.83
Nov. 6.2	9.020 205	37.85 135	46.845 122	52.27 28	31.758 137	36.41 27	7.501 153	71.82 101
16.1	8.851 169	36.06 179	46.755 90	52.64 37	31.659 99	36.07 34	7.381 120	70.48 134
26.1	8.725 126	33.88 218	46.705 50	53.10 46	31.604 55	35.68 39	7.299 82	68.84 164
Dec. 6.1	8.649 76	31.37 251	46.698 7	53.64 54	31.596 8	35.26 42	7.259 40	66.94 190
	24	278	37	62	42	43	4	213
16.0	8.625	28.59	46.735	54.26	31.638	34.83	7.263	64.81
26.0	8.654 20	25.62 297	46.816 81	54.96 70	31.729 91	34.40 43	7.313 50	62.53 228
36.0	8.737 83	22.56 306	46.940 124	55.70 74	31.866 137	34.00 40	7.405 92	60.18 235
Mean Place	7.695	20.61	43.817	58.66	28.264	37.80	5.321	57.52
Sec $\delta$ , Tan $\delta$	1.281	+0.801	1.013	-0.161	1.123	-0.511	1.067	+0.373
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.04	-0.01	+0.07	0.00	+0.07	+0.01	+0.05	0.00
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	6 Aquilæ. Mag. 4.5			λ Pavonis. Mag. 4.4			β Lyre. Var. 3.4-4.1			50 Draconis. Mag. 5.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	18	42	- 4 50	18	44	-62 16	18	47	+33 15	18	48	+75 19
	s		"	s		"	s		"	s		"
Jan. 1.0	45.920		18.58	30.77		65.56	0.001		53.87	57.44		70.27
11.0	46.062	142	19.56 98	31.02	25	63.13 243	0.107	106	51.01 286	57.44	0	66.83 344
21.0	46.239	177	20.53 97	31.36	34	60.81 232	0.258	151	48.20 281	57.61	17	63.42 341
30.9	46.447	208	21.42 89	31.76	40	58.65 216	0.449	191	45.58 262	57.95	34	60.19 323
Feb. 9.9	46.680	233	22.18 76	32.22	46	56.68 197	0.677	228	43.23 235	58.43	48	57.26 293
		255	60		51	172		259	197		61	253
19.9	46.935		22.78 39	32.73		54.96	0.936		41.26 152	59.04		54.73 203
Mar. 1.8	47.206	271	23.17 14	33.29	56	53.49 147	1.220	284	39.74 101	59.76	72	52.70 144
11.8	47.490	284	23.31 10	33.87	58	52.32 117	1.524	304	38.73 44	60.56	80	51.26 81
21.8	47.782	292	23.21 37	34.47	60	51.44 88	1.840	316	38.29 13	61.43	87	50.45 15
31.8	48.079	297	22.84 62	35.08	61	50.89 24	2.163	323	38.42 68	62.32	89	50.30 52
		298			61			325			89	
Apr. 10.7	48.377		22.22 84	35.69		50.65 8	2.488		39.10 122	63.21		50.82 114
20.7	48.673	296	21.38 103	36.29	60	50.73 40	2.808	320	40.32 170	64.05	84	51.96 173
30.7	48.961	288	20.35 119	36.87	58	51.13 72	3.115	307	42.02 213	64.85	80	53.69 224
May 10.7	49.237	276	19.16 129	37.42	55	51.85 100	3.406	291	44.15 247	65.56	71	55.93 269
20.6	49.495	258	17.87 135	37.93	51	52.85 130	3.671	265	46.62 272	66.16	60	58.62 305
		236			46			237			49	
30.6	49.731		16.52 136	38.39		54.15 154	3.908		49.34 291	66.65	35	61.67 330
June 9.6	49.940	209	15.16 135	38.80	41	55.69 174	4.108	200	52.25 301	67.00	21	64.97 346
19.5	50.116	176	13.81 128	39.14	34	57.43 190	4.268	160	55.26 303	67.21	7	68.43 354
29.5	50.257	141	12.53 118	39.39	25	59.33 201	4.384	116	58.29 296	67.28	10	71.97 351
July 9.5	50.357	100	11.35 108	39.57	18	61.34 205	4.453	69	61.25 284	67.18	23	75.48 341
		58			8			21				
19.5	50.415	16	10.27 94	39.65	7	63.39 204	4.474	28	64.09 264	66.95		78.89 323
29.4	50.431	26	9.33 80	39.65	0	65.43 194	4.446	74	66.73 240	66.58	37	82.12 297
Aug. 8.4	50.405	67	8.53 65	39.56	9	67.37 177	4.372	118	69.13 209	66.08	50	85.09 266
18.4	50.338	102	7.88 52	39.39	17	69.14 153	4.254	157	71.22 176	65.45	63	87.75 228
28.4	50.236	132	7.36 37	39.15	24	70.67 122	4.097	188	72.98 139	64.72	73	90.03 187
					30						82	
Sept. 7.3	50.104		6.99 23	38.85		71.89 87	3.909		74.37 99	63.90		91.90 141
17.3	49.951	153	6.76 10	38.49	36	72.76 48	3.695	214	75.36 58	63.02	88	93.31 90
27.3	49.783	168	6.66 2	38.10	39	73.24 3	3.467	228	75.94 14	62.10	92	94.21 39
Oct. 7.2	49.610	173	6.68 14	37.70	40	73.27 41	3.233	234	76.08 29	61.15	95	94.60 14
17.2	49.445	165	6.82 28	37.32	38	72.86 85	3.004	229	75.79 73	60.20	95	94.46 68
		151			35			214			91	
27.2	49.294	125	7.10 40	36.97	31	72.01 127	2.790		75.06 117	59.29		93.78 121
Nov. 6.2	49.169	94	7.50 52	36.66	25	70.74 163	2.600	190	73.89 157	58.43	86	92.57 173
16.1	49.075	55	8.02 64	36.41	17	69.11 194	2.443	157	72.32 196	57.64	79	90.84 221
26.1	49.020	14	8.66 76	36.24	8	67.17 219	2.326	117	70.36 228	56.95	69	88.63 264
Dec. 6.1	49.006	30	9.42 86	36.16	1	64.98 235	2.253	73	68.08 256	56.40	55	85.99 300
								24			42	
16.1	49.036		10.28 93	36.17		62.63 244	2.229		65.52 274	55.98		82.99 325
26.0	49.110	74	11.21 96	36.28	11	60.19 246	2.254	25	62.78 285	55.71	27	79.74 341
36.0	49.224	114	12.17	36.48	20	57.73	2.328	74	59.93	55.62	9	76.33
Mean Place	46.231		15.57	31.787		63.04	0.919		56.11	63.584		71.11
Sec δ, Tan δ	1.004		-0.085	2.150		-1.903	1.196		+0.656	3.950		+3.821
Dψ α, Dω α	+0.06		0.00	+0.11		+0.02	+0.04		-0.01	-0.04		-0.05
Dψ δ, Dω δ	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Lyrae. Mag. 3.3			ε Aquilæ. Mag. 4.2			ζ Sagittarii. Mag. 2.7			ζ Aquilæ. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h 18	m 55	° +32 ' 34	h 18	m 55	° +14 ' 57	h 18	m 57	° -29 ' 59	h 19	m 1	° +13 ' 44
	s		"	s		"	s		"	s		"
Jan. 1.0	49.401		28.17	50.786		14.57	19.607		63.39	35.204		19.23
11.0	49.498	97	25.35 282	50.900	114	12.52 205	19.760	153	62.76 63	35.312	108	17.25 198
21.0	49.639	141	22.58 277	51.050	150	10.51 201	19.953	193	62.14 62	35.457	145	15.32 193
30.9	49.821	182	19.98 260	51.233	183	8.63 188	20.182	229	61.53 61	35.636	179	13.50 182
Feb. 9.9	50.040	219	17.63 235	51.447	214	6.97 166	20.443	261	60.94 59	35.845	209	11.88 162
		251	199		237	140		285	60		233	135
19.9	50.291		15.64	51.684		5.57	20.728		60.34	36.078		10.53
Mar. 1.8	50.567	276	14.09 155	51.943	259	4.54 103	21.034	306	59.74 60	36.333	255	9.53 100
11.8	50.865	298	13.05 104	52.218	275	3.91 63	21.356	322	59.13 61	36.605	272	8.92 61
21.8	51.177	312	12.57 48	52.505	287	3.70 21	21.690	334	58.52 61	36.889	284	8.72 20
31.8	51.497	320	12.64 7	52.799	294	3.92 22	22.033	343	57.91 61	37.182	293	8.95 23
		324	63		297	66		345	59		297	65
Apr. 10.7	51.821		13.27	53.096		4.58	22.378		57.32	37.479		9.60
20.7	52.142	321	14.43 116	53.391	295	5.64 106	22.722	344	56.76 56	37.775	296	10.65 106
30.7	52.452	310	16.07 164	53.680	289	7.06 142	23.061	339	56.24 52	38.066	291	12.04 139
May 10.7	52.747	295	18.14 207	53.957	277	8.80 174	23.389	328	55.79 45	38.346	280	13.75 171
20.6	53.020	273	20.56 242	54.216	259	10.79 199	23.698	309	55.43 36	38.608	262	15.70 196
		243	270		236	218		298	25		242	214
30.6	53.263		23.26	54.452		12.97	23.986		55.18	38.850		17.84
June 9.6	53.471	208	26.14 288	54.659	207	15.26 229	24.243	257	55.04 14	39.063	213	20.09 225
19.5	53.641	170	29.13 299	54.834	175	17.60 234	24.465	222	55.03 1	39.243	180	22.38 229
29.5	53.767	126	32.15 302	54.972	138	19.93 233	24.646	181	55.15 12	39.387	144	24.67 229
July 9.5	53.846	79	35.13 298	55.069	97	22.19 226	24.783	137	55.40 25	39.489	102	26.88 221
		32	285		53	212		88	34		60	209
19.5	53.878		37.98	55.122	10	24.31	24.871	39	55.74	39.549	16	28.97
29.4	53.861	17	40.64 266	55.132	34	26.28 197	24.910	13	56.16 42	39.565	27	30.90 193
Aug. 8.4	53.797	64	43.07 243	55.098	74	28.04 176	24.897	60	56.64 48	39.538	68	32.62 172
18.4	53.689	108	45.21 214	55.024	111	29.56 152	24.837	103	57.15 51	39.470	105	34.13 151
28.4	53.541	148	47.03 182	54.913	140	30.82 126	24.734	139	57.65 50	39.365	136	35.38 126
		181	145		140	100		139	45		136	99
Sept. 7.3	53.360		48.48	54.773		31.82	24.595		58.10	39.229		36.37
17.3	53.153	207	49.54 106	54.607	166	32.52 70	24.426	169	58.47 37	39.067	162	37.07 70
27.3	52.930	223	50.19 65	54.427	180	32.93 41	24.239	187	58.73 26	38.891	176	37.49 42
Oct. 7.2	52.700	230	50.42 23	54.240	187	33.03 10	24.045	194	58.87 14	38.707	184	37.61 12
17.2	52.473	227	50.21 21	54.057	183	32.82 21	23.854	191	58.88 1	38.525	182	37.43 18
		213	65		169	51		175	14		168	46
27.2	52.260		49.56	53.888		32.31	23.679		58.74	38.357		36.97
Nov. 6.2	52.068	192	48.49 107	53.739	149	31.49 82	23.529	150	58.46 28	38.208	149	36.21 76
16.1	51.909	159	47.01 148	53.621	118	30.39 110	23.415	114	58.07 39	38.089	119	35.16 105
26.1	51.787	122	45.15 186	53.537	84	29.02 137	23.343	72	57.59 48	38.005	84	33.86 130
Dec. 6.1	51.709	78	42.95 220	53.495	42	27.41 161	23.316	27	57.03 56	37.959	46	32.33 153
		32	249		1	181		25	60		4	174
16.1	51.677		40.46	53.494		25.60	23.341		56.43	37.955		30.59
26.0	51.694	17	37.78 268	53.537	43	23.64 196	23.414	73	55.80 63	37.994	39	28.71 188
36.0	51.760	66	34.99 279	53.622	85	21.61 203	23.536	122	55.17 63	38.075	81	26.75 196
Mean Place	50.298		29.74	51.301		16.73	19.884		60.26	35.698		21.13
Sec δ, Tan δ	1.187		+0.639	1.035		+0.267	1.155		-0.577	1.029		+0.245
D <sub>δ</sub> α, D <sub>α</sub> α	+0.04		-0.01	+0.05		0.00	+0.08		+0.01	+0.05		0.00
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\lambda$ Aquilæ. Mag. 3.6			$\alpha$ Coronæ Australis. Mag. 4.1			$\epsilon$ Lyre. Mag. 5.1			$\pi$ Sagittarii. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	19	1	— 5 0	19	3	—38 1	19	4	+35 57	19	4	—21 9
	s		"	s		"	s		"	s		"
Jan. 1.0	50.348		30.77	49.226		69.70	19.421		68.82	49.462		26.64
11.0	50.472	124	31.69	49.381	155	68.55	19.503	82	65.91	49.597	135	26.54
21.0	50.631	159	32.59	49.583	202	67.42	19.635	132	63.04	49.770	173	26.44
30.9	50.821	190	33.41	49.825	242	66.32	19.809	174	60.31	49.976	206	26.31
Feb. 9.9	51.039	218	34.10	50.100	275	65.26	20.022	213	57.85	50.211	235	26.13
		240			306			248			261	
19.9	51.279		34.64	50.406		64.26	20.270		55.75	50.472		25.89
Mar. 1.9	51.540	261	34.96	50.735	329	63.31	20.547	277	54.08	50.751	279	25.57
11.8	51.815	275	35.05	51.084	349	62.43	20.847	300	52.92	51.046	295	25.16
21.8	52.101	286	34.88	51.446	362	61.62	21.164	317	52.31	51.355	309	24.66
31.8	52.396	295	34.46	51.818	372	60.90	21.493	329	52.30	51.672	317	24.06
		299			377			333			322	
Apr. 10.7	52.695		33.78	52.195		60.26	21.826		52.85	51.994		23.37
20.7	52.994	299	32.89	52.572	377	59.74	22.156	330	53.95	52.316	322	22.63
30.7	53.289	295	31.81	52.944	372	59.34	22.479	323	55.57	52.635	319	21.85
May 10.7	53.574	285	30.56	53.304	360	59.09	22.785	306	57.64	52.943	308	21.07
20.6	53.845	271	29.21	53.645	341	58.99	23.069	284	60.08	53.238	295	20.31
		249			317			254			274	
30.6	54.094		27.81	53.962		59.05	23.323		62.82	53.512		19.61
June 9.6	54.318	224	26.39	54.248	286	59.30	23.542	219	65.78	53.758	246	18.97
19.6	54.512	194	24.99	54.494	246	59.70	23.720	178	68.88	53.972	214	18.43
29.5	54.669	157	23.66	54.697	203	60.25	23.854	134	72.02	54.149	177	18.01
July 9.5	54.786	117	22.43	54.850	153	60.95	23.940	86	75.12	54.283	134	17.71
		76			100			36			89	
19.5	54.862		21.33	54.950		61.74	23.976		78.11	54.372		17.53
29.4	54.894	32	20.35	54.994	44	62.61	23.961	15	80.94	54.414	42	17.46
Aug. 8.4	54.882	12	19.52	54.985	9	63.52	23.897	64	83.52	54.410	4	17.48
18.4	54.829	53	18.85	54.922	63	64.42	23.788	109	85.82	54.361	49	17.57
28.4	54.740	89	18.33	54.812	110	65.26	23.636	152	87.79	54.272	89	17.72
		123			152			186			126	
Sept. 7.3	54.617		17.95	54.660		65.99	23.450		89.39	54.147		17.90
17.3	54.470	147	17.71	54.476	184	66.60	23.236	214	90.59	53.995	152	18.08
27.3	54.306	164	17.60	54.270	206	67.02	23.003	233	91.37	53.823	172	18.25
Oct. 7.3	54.136	170	17.62	54.054	216	67.23	22.761	242	91.71	53.644	179	18.39
17.2	53.969	167	17.76	53.842	212	67.23	22.521	240	91.59	53.467	177	18.48
		155			199			229			163	
27.2	53.814		18.03	53.643		66.99	22.292		91.01	53.304		18.51
Nov. 6.2	53.680	134	18.41	53.472	171	66.55	22.085	207	90.00	53.163	141	18.51
16.1	53.576	104	18.90	53.338	134	65.90	21.908	177	88.53	53.054	109	18.46
26.1	53.508	68	19.51	53.248	90	65.08	21.768	140	86.68	52.983	71	18.39
Dec. 6.1	53.480	28	20.23	53.209	39	64.13	21.672	96	84.47	52.955	28	18.30
		13			15			48			17	
16.1	53.493		21.03	53.224		63.08	21.624		81.94	52.972		18.20
26.0	53.548	55	21.91	53.293	69	61.97	21.626	2	79.20	53.034	62	18.10
36.0	53.644	96	22.82	53.413	120	60.83	21.677	51	76.33	53.139	106	18.01
Mean Place	50.651		28.20	49.557		66.34	20.420		69.57	49.713		23.62
Sec $\delta$ , Tan $\delta$	1.004		—0.088	1.270		—0.782	1.236		+0.726	1.072		—0.387
$D_{\psi} a, D_{\omega} a$	+0.06		0.00	+0.08		+0.01	+0.04		—0.01	+0.07		+0.01
$D_{\psi} \delta, D_{\omega} \delta$	+0.1		—1.0	+0.1		—1.0	+0.1		—1.0	+0.1		—1.0

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Aquilæ. Mag. 5.1		κ Cygni. Mag. 4.0		τ Draconis. Mag. 4.6		δ Aquilæ. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 13 s	° ' " +11 26 "	h m 19 15 s	° ' " +53 12 "	h m 19 17 s	° ' " +73 11 "	h m 19 21 s	° ' " + 2 56 "
Jan. 1.0	54.783	40.09	9.264	54.67	4.32	68.70	18.471	52.60
11.0	54.880 97	38.28 181	9.304 40	51.37 330	4.26 6	65.32 338	18.568 97	51.28 132
21.0	55.015 135	36.49 179	9.409 105	48.07 330	4.33 7	61.90 342	18.703 135	49.98 130
30.9	55.183 168	34.82 167	9.578 169	44.89 318	4.55 22	58.57 333	18.870 167	48.78 120
Feb. 9.9	55.382 199	33.32 150	9.807 229	41.97 292	4.91 36	55.48 309	19.065 195	47.72 106
	224	124	281	256	47	275	221	86
19.9	55.606	32.08	10.088	39.41	5.38	52.73	19.286	46.86
Mar. 1.9	55.852 246	31.14 94	10.416 328	37.32 209	5.96 58	50.43 230	19.529 243	46.28 58
11.8	56.117 265	30.58 56	10.782 366	35.77 155	6.63 67	48.68 175	19.791 262	45.99 29
21.8	56.396 279	30.41 17	11.177 395	34.84 93	7.36 73	47.54 114	20.067 276	46.01 2
31.8	56.685 289	30.65 24	11.589 412	34.54 30	8.14 78	47.05 49	20.354 287	46.37 36
	295	64	420	34	78	16	294	69
Apr. 10.8	56.980	31.29	12.009	34.88	8.92	47.21	20.648	47.06
20.7	57.278 298	32.31 102	12.427 418	35.87 99	9.70 78	48.02 81	20.946 298	48.05 99
30.7	57.572 294	33.67 136	12.832 405	37.43 156	10.45 75	49.45 143	21.242 296	49.31 126
May 10.7	57.857 285	35.33 166	13.215 383	39.52 209	11.14 69	51.43 198	21.531 289	50.79 148
20.6	58.127 270	37.21 188	13.565 350	42.08 256	11.75 61	53.90 247	21.808 277	52.45 166
	249	207	309	293	52	287	257	177
30.6	58.376	39.28	13.874	45.01	12.27	56.77	22.065	54.22
June 9.6	58.599 223	41.45 217	14.133 259	48.21 320	12.67 40	59.97 320	22.298 233	56.06 184
19.6	58.792 193	43.67 222	14.338 205	51.61 340	12.95 28	63.38 341	22.501 203	57.91 185
29.5	58.948 156	45.88 221	14.481 143	55.13 352	13.12 17	66.95 357	22.670 169	59.73 182
July 9.5	59.064 116	48.01 213	14.561 80	58.64 351	13.15 3	70.55 360	22.799 129	61.46 173
	74	202	14	344	11	355	88	160
19.5	59.138	50.03	14.575	62.08	13.04	74.10	22.887	63.06
29.5	59.168 30	51.90 187	14.523 52	65.38 330	12.82 22	77.53 343	22.931 44	64.52 146
Aug. 8.4	59.154 14	53.57 167	14.408 115	68.46 308	12.48 34	80.77 324	22.932 1	65.81 129
18.4	59.098 56	55.04 147	14.233 175	71.25 279	12.02 46	83.74 297	22.891 41	66.90 109
28.4	59.005 93	56.26 122	14.005 228	73.68 243	11.45 57	86.37 263	22.811 80	67.80 90
	126	97	274	205	66	225	114	69
Sept. 7.3	58.879	57.23	13.731	75.73	10.79	88.62	22.697	68.49
17.3	58.727 152	57.93 70	13.420 311	77.34 161	10.08 71	90.43 181	22.556 141	68.99 50
27.3	58.556 171	58.37 44	13.083 337	78.47 113	9.31 77	91.77 134	22.396 160	69.27 28
Oct. 7.3	58.377 179	58.53 16	12.730 353	79.10 63	8.50 81	92.61 84	22.227 169	69.36 9
17.2	58.199 178	58.41 12	12.377 353	79.22 12	7.68 82	92.91 30	22.058 169	69.25 11
	167	38	344	41	80	25	160	31
27.2	58.032	58.03	12.033	78.81	6.88	92.66	21.898	68.94
Nov. 6.2	57.883 149	57.37 66	11.710 323	77.85 96	6.11 77	91.86 80	21.755 143	68.44 50
16.2	57.761 122	56.45 92	11.422 288	76.39 146	5.40 71	90.51 135	21.639 116	67.75 69
26.1	57.671 90	55.28 117	11.177 245	74.45 194	4.77 63	88.65 186	21.555 84	66.89 86
Dec. 6.1	57.620 51	53.89 139	10.984 193	72.07 238	4.23 54	86.31 234	21.507 48	65.88 101
	11	158	133	276	43	275	8	116
16.1	57.609	52.31	10.851	69.31	3.80	83.56	21.499	64.72
26.0	57.639 30	50.60 171	10.781 70	66.26 305	3.50 30	80.48 308	21.531 32	63.46 126
36.0	57.710 71	48.80 180	10.778 3	63.02 324	3.35 15	77.18 330	21.603 72	62.14 132
Mean Place	55.236	41.49	11.130	53.51	9.537	66.36	18.819	54.21
Sec δ, Tan δ	1.020	+0.202	1.670	+1.337	3.460	+3.312	1.001	+0.052
D <sub>♌</sub> a, D <sub>♌</sub> α	+0.06	0.00	+0.03	-0.03	-0.02	-0.07	+0.06	0.00
+ δ, D <sub>♌</sub> δ	+0.1	-0.9	+0.1	-0.9	+0.1	-0.9	+0.1	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Cygni. Mag. 3.2		$\epsilon$ Cygni. Mag. 3.9		$\mu$ Aquilæ. Mag. 4.6		$h$ Sagittarii. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 27 s	° ' +27 46 "	h m 19 27 s	° ' +51 32 "	h m 19 30 s	° ' + 7 11 "	h m 19 31 s	° ' -25 3 "
Jan. 1.0	21.686	64.94	35.110	71.22	1.730	66.15	39.235	67.46
11.0	21.754 68	62.40 254	35.135 25	67.99 323	1.817 87	64.61 154	39.344 109	67.05 41
21.0	21.864 110	59.87 253	35.224 89	64.74 325	1.940 123	63.09 152	39.493 149	66.60 45
31.0	22.013 149	57.45 242	35.373 149	61.59 315	2.095 155	61.66 143	39.677 184	66.11 49
Feb. 9.9	22.197 184	55.24 221	35.580 207	58.66 293	2.280 185	60.41 125	39.893 216	65.57 54
	218	192	259	260	213	105	244	59
19.9	22.415	53.32	35.839	56.06	2.493	59.36	40.137	64.98
Mar. 1.9	22.662 247	51.79 153	36.145 306	53.91 215	2.729 236	58.60 76	40.405 268	64.33 65
11.8	22.932 270	50.71 108	36.490 345	52.29 162	2.985 256	58.15 45	40.693 288	63.60 73
21.8	23.221 289	50.12 59	36.864 374	51.25 104	3.257 272	58.07 8	40.998 305	62.81 79
31.8	23.526 305	50.06 6	37.261 397	50.85 40	3.541 284	58.36 29	41.316 318	61.97 84
	313	48	407	23	293	65	327	89
Apr. 10.8	23.839	50.54	37.668	51.08	3.834	59.01	41.643	61.08
20.7	24.155 316	51.52 98	38.077 409	51.93 85	4.132 298	59.99 96	41.976 333	60.17 91
30.7	24.468 313	52.97 145	38.477 400	53.39 146	4.429 297	61.29 130	42.309 333	59.27 90
May 10.7	24.771 303	54.82 185	38.859 382	55.38 199	4.720 291	62.86 157	42.637 328	58.40 87
20.7	25.059 288	57.05 223	39.212 353	57.83 245	4.999 279	64.63 177	42.954 317	57.60 80
	264	251	316	284	260	192	298	70
30.6	25.323	59.56	39.528	60.67	5.259	66.55	43.252	56.90
June 9.6	25.560 237	62.27 271	39.799 271	63.82 315	5.497 238	68.57 202	43.526 274	56.30 60
19.6	25.761 201	65.11 284	40.019 220	67.18 336	5.705 208	70.64 207	43.769 243	55.83 47
29.5	25.922 161	68.01 290	40.181 162	70.66 348	5.878 173	72.67 203	43.975 206	55.51 32
July 9.5	26.040 118	70.88 287	40.282 101	74.17 351	6.012 134	74.63 196	44.139 164	55.36 15
	72	279	37	346	93	186	119	2
19.5	26.112 24	73.67 263	40.319 26	77.63 334	6.105 49	76.49 169	44.258 70	55.34 11
29.5	26.136 23	76.30 244	40.293 90	80.97 313	6.154 5	78.18 153	44.328 21	55.45 24
Aug. 8.4	26.113 68	78.74 218	40.203 148	84.10 286	6.159 37	79.71 133	44.349 27	55.69 31
18.4	26.045 110	80.92 190	40.055 201	86.96 253	6.122 77	81.04 109	44.322 72	56.00 37
28.4	25.935 145	82.82 157	39.854 248	89.49 216	6.045 111	82.13 88	44.250 111	56.37 40
Sept. 7.4	25.790	84.39	39.606	91.65	5.934	83.01	44.139	56.77
17.3	25.615 175	85.61 84	39.321 315	93.38 127	5.796 138	83.64 40	43.996 143	57.16 39
27.3	25.420 195	86.45 47	39.006 330	94.65 78	5.636 160	84.04 16	43.829 167	57.52 36
Oct. 7.3	25.213 207	86.92 6	38.676 336	95.43 26	5.466 170	84.20 7	43.650 179	57.81 29
17.2	25.003 202	86.98 35	38.340 329	95.69 25	5.294 164	84.13 32	43.467 174	58.01 11
27.2	24.801	86.63	38.011	95.44	5.130	83.81	43.293	58.12
Nov. 6.2	24.616 185	85.88 75	37.702 309	94.66 78	4.982 148	83.29 52	43.139 154	58.13 1
16.2	24.456 160	84.74 114	37.422 280	93.36 130	4.858 124	82.51 78	43.012 127	58.04 9
26.1	24.328 128	83.23 151	37.180 242	91.56 180	4.764 94	81.54 97	42.918 94	57.87 17
Dec. 6.1	24.237 91	81.39 184	36.987 193	89.32 224	4.707 57	80.37 117	42.866 52	57.61 26
	49	213	137	263	19	132	9	30
16.1	24.188	79.26	36.850	86.69	4.688	79.05	42.857	57.31
26.1	24.183 5	76.91 235	36.771 79	83.74 295	4.708 20	77.61 144	42.893 36	56.96 35
36.0	24.221 38	74.42 249	36.755 16	80.60 314	4.768 60	76.08 153	42.973 80	56.57 39
Mean Place	22.426	64.40	36.836	68.92	2.113	67.10	39.459	64.19
Sec $\delta$ , Tan $\delta$	1.130	+0.527	1.608	+1.260	1.008	+0.127	1.104	-0.468
$D_{\psi} a$ , $D_{\infty} a$	+0.05	-0.01	+0.03	-0.03	+0.06	0.00	+0.07	+0.01
$D_{\psi} \delta$ , $D_{\infty} \delta$	+0.1	-0.9	+0.1	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Aquilæ. Mag. 5.0		$\theta$ Cygni. Mag. 4.6		$\delta$ Sagittarii. Mag. 5.4		$\beta$ Sagittæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 32 s	° ' " — 7 12 "	h m 19 34 s	° ' " +50 1 "	h m 19 35 s	° ' " —16 28 "	h m 19 37 s	° ' " +17 16 "
Jan. 1.0	25.381	48.17	11.352	44.90	57.948	66.99	18.730	58.95
11.0	25.475 <sup>94</sup>	48.86 <sup>69</sup>	11.371 <sup>19</sup>	41.73 <sup>317</sup>	58.045 <sup>97</sup>	67.11 <sup>12</sup>	18.800 <sup>70</sup>	56.92 <sup>203</sup>
21.0	25.606 <sup>131</sup>	49.51 <sup>65</sup>	11.451 <sup>80</sup>	38.53 <sup>320</sup>	58.181 <sup>136</sup>	67.18 <sup>7</sup>	18.907 <sup>107</sup>	54.89 <sup>203</sup>
31.0	25.770 <sup>164</sup>	50.11 <sup>60</sup>	11.591 <sup>140</sup>	35.41 <sup>312</sup>	58.351 <sup>170</sup>	67.20 <sup>2</sup>	19.050 <sup>143</sup>	52.96 <sup>193</sup>
Feb. 9.9	25.962 <sup>192</sup>	50.58 <sup>47</sup>	11.786 <sup>195</sup>	32.49 <sup>292</sup>	58.551 <sup>200</sup>	67.13 <sup>7</sup>	19.226 <sup>176</sup>	51.20 <sup>176</sup>
	220	31	246	259	226	17	205	149
19.9	26.182	50.89	12.032	29.90	58.777	66.96	19.431	49.71
Mar. 1.9	26.422 <sup>240</sup>	51.02 <sup>13</sup>	12.324 <sup>292</sup>	27.74 <sup>216</sup>	59.027 <sup>250</sup>	66.66 <sup>30</sup>	19.662 <sup>231</sup>	48.54 <sup>117</sup>
11.8	26.683 <sup>261</sup>	50.95 <sup>7</sup>	12.654 <sup>330</sup>	26.09 <sup>165</sup>	59.295 <sup>268</sup>	66.22 <sup>44</sup>	19.916 <sup>254</sup>	47.75 <sup>79</sup>
21.8	26.959 <sup>276</sup>	50.63 <sup>32</sup>	13.015 <sup>361</sup>	25.02 <sup>107</sup>	59.581 <sup>286</sup>	65.64 <sup>58</sup>	20.188 <sup>272</sup>	47.39 <sup>36</sup>
31.8	27.248 <sup>289</sup>	50.08 <sup>55</sup>	13.398 <sup>383</sup>	24.58 <sup>44</sup>	59.881 <sup>300</sup>	64.91 <sup>73</sup>	20.475 <sup>287</sup>	47.48 <sup>9</sup>
	297	77	397	18	309	86	297	53
Apr. 10.8	27.545	49.31	13.795	24.76	60.190	64.05	20.772	48.01
20.7	27.848 <sup>303</sup>	48.33 <sup>98</sup>	14.194 <sup>399</sup>	25.56 <sup>80</sup>	60.504 <sup>314</sup>	63.08 <sup>97</sup>	21.074 <sup>302</sup>	48.97 <sup>96</sup>
30.7	28.151 <sup>303</sup>	47.17 <sup>116</sup>	14.587 <sup>393</sup>	26.97 <sup>141</sup>	60.820 <sup>316</sup>	62.03 <sup>105</sup>	21.376 <sup>302</sup>	50.33 <sup>136</sup>
May 10.7	28.449 <sup>298</sup>	45.89 <sup>128</sup>	14.965 <sup>378</sup>	28.90 <sup>193</sup>	61.131 <sup>311</sup>	60.93 <sup>110</sup>	21.672 <sup>296</sup>	52.04 <sup>171</sup>
20.7	28.737 <sup>288</sup>	44.51 <sup>138</sup>	15.316 <sup>351</sup>	31.31 <sup>241</sup>	61.431 <sup>300</sup>	59.82 <sup>111</sup>	21.957 <sup>285</sup>	54.05 <sup>201</sup>
	271	143	317	279	285	108	265	222
30.6	29.008	43.08	15.633	34.10	61.716	58.74	22.222	56.27
June 9.6	29.256 <sup>248</sup>	41.66 <sup>142</sup>	15.908 <sup>275</sup>	37.21 <sup>311</sup>	61.977 <sup>261</sup>	57.71 <sup>103</sup>	22.463 <sup>241</sup>	58.66 <sup>239</sup>
19.6	29.475 <sup>219</sup>	40.26 <sup>140</sup>	16.134 <sup>226</sup>	40.54 <sup>333</sup>	62.211 <sup>234</sup>	56.78 <sup>93</sup>	22.673 <sup>210</sup>	61.14 <sup>248</sup>
29.5	29.661 <sup>186</sup>	38.95 <sup>131</sup>	16.305 <sup>171</sup>	43.99 <sup>345</sup>	62.409 <sup>198</sup>	55.96 <sup>82</sup>	22.847 <sup>174</sup>	63.64 <sup>250</sup>
July 9.5	29.810 <sup>149</sup>	37.75 <sup>120</sup>	16.417 <sup>112</sup>	47.49 <sup>350</sup>	62.568 <sup>159</sup>	55.29 <sup>67</sup>	22.981 <sup>134</sup>	66.11 <sup>247</sup>
	104	107	50	346	115	54	92	238
19.5	29.914 <sup>61</sup>	36.68 <sup>93</sup>	16.467 <sup>12</sup>	50.95 <sup>334</sup>	62.683 <sup>70</sup>	54.75 <sup>40</sup>	23.073 <sup>47</sup>	68.49 <sup>222</sup>
29.5	29.975 <sup>17</sup>	35.75 <sup>76</sup>	16.455 <sup>73</sup>	54.29 <sup>314</sup>	62.753 <sup>24</sup>	54.35 <sup>25</sup>	23.120 <sup>1</sup>	70.71 <sup>203</sup>
Aug. 8.4	29.992 <sup>28</sup>	34.99 <sup>61</sup>	16.382 <sup>130</sup>	57.43 <sup>290</sup>	62.777 <sup>22</sup>	54.10 <sup>13</sup>	23.121 <sup>42</sup>	72.74 <sup>182</sup>
18.4	29.964 <sup>67</sup>	34.38 <sup>46</sup>	16.252 <sup>184</sup>	60.33 <sup>256</sup>	62.755 <sup>65</sup>	53.97 <sup>3</sup>	23.079 <sup>83</sup>	74.56 <sup>155</sup>
28.4	29.897 <sup>104</sup>	33.92 <sup>32</sup>	16.068 <sup>231</sup>	62.89 <sup>220</sup>	62.690 <sup>101</sup>	53.94 <sup>7</sup>	22.996 <sup>118</sup>	76.11 <sup>128</sup>
Sept. 7.4	29.793	33.60	15.837	65.09	62.589	54.01	22.878	77.39
17.3	29.662 <sup>131</sup>	33.43 <sup>17</sup>	15.568 <sup>269</sup>	66.87 <sup>178</sup>	62.456 <sup>133</sup>	54.14 <sup>13</sup>	22.731 <sup>147</sup>	78.38 <sup>99</sup>
27.3	29.509 <sup>153</sup>	33.36 <sup>7</sup>	15.271 <sup>297</sup>	68.20 <sup>133</sup>	62.302 <sup>154</sup>	54.30 <sup>16</sup>	22.562 <sup>169</sup>	79.05 <sup>67</sup>
Oct. 7.3	29.343 <sup>166</sup>	33.40 <sup>4</sup>	14.957 <sup>314</sup>	69.05 <sup>85</sup>	62.133 <sup>169</sup>	54.49 <sup>19</sup>	22.381 <sup>181</sup>	79.40 <sup>35</sup>
17.2	29.177 <sup>166</sup>	33.56 <sup>16</sup>	14.636 <sup>321</sup>	69.40 <sup>35</sup>	61.962 <sup>171</sup>	54.69 <sup>20</sup>	22.197 <sup>184</sup>	79.45 <sup>5</sup>
	159	25	315	18	163	19	178	29
27.2	29.018	33.81	14.321	69.22	61.799	54.88	22.019	79.16
Nov. 6.2	28.875 <sup>143</sup>	34.14 <sup>33</sup>	14.023 <sup>298</sup>	68.52 <sup>70</sup>	61.651 <sup>148</sup>	55.07 <sup>19</sup>	21.856 <sup>163</sup>	78.56 <sup>60</sup>
16.2	28.757 <sup>118</sup>	34.55 <sup>41</sup>	13.752 <sup>271</sup>	67.31 <sup>121</sup>	61.529 <sup>122</sup>	55.24 <sup>17</sup>	21.715 <sup>141</sup>	77.65 <sup>91</sup>
26.1	28.670 <sup>87</sup>	35.04 <sup>49</sup>	13.518 <sup>234</sup>	65.60 <sup>171</sup>	61.439 <sup>90</sup>	55.40 <sup>16</sup>	21.605 <sup>110</sup>	76.43 <sup>122</sup>
Dec. 6.1	28.619 <sup>51</sup>	35.60 <sup>56</sup>	13.330 <sup>188</sup>	63.44 <sup>216</sup>	61.387 <sup>52</sup>	55.56 <sup>16</sup>	21.529 <sup>76</sup>	74.96 <sup>147</sup>
	11	62	136	255	12	15	38	171
16.1	28.608	36.22	13.194	60.89	61.375	55.71	21.491	73.25
26.1	28.637 <sup>29</sup>	36.89 <sup>67</sup>	13.114 <sup>80</sup>	58.03 <sup>286</sup>	61.405 <sup>30</sup>	55.85 <sup>14</sup>	21.492 <sup>1</sup>	71.37 <sup>188</sup>
36.0	28.706 <sup>69</sup>	37.62 <sup>73</sup>	13.094 <sup>20</sup>	54.93 <sup>310</sup>	61.476 <sup>71</sup>	55.98 <sup>13</sup>	21.535 <sup>43</sup>	69.37 <sup>200</sup>
Mean Place	25.638	46.14	12.963	42.06	58.167	64.31	19.243	58.67
Sec $\delta$ , Tan $\delta$	1.008	−0.127	1.557	+1.193	1.043	−0.296	1.048	+0.311
$D\alpha, D_{\alpha}$	+0.06	0.00	+0.03	−0.03	+0.07	+0.01	+0.05	−0.01
$D\delta, D_{\delta}$	+0.2	−0.9	+0.2	−0.9	+0.2	−0.9	+0.2	−0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	15 Cygni. Mag. 5.0			f Sagittarii. Mag. 5.1			γ Aquilæ. Mag. 2.8			δ Cygni. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	19	41	+37 8	19	41	-19 57	19	42	+10 24	19	42	+44 55
	s		"	s		"	s		"	s		"
Jan. 1.0	16.044		74.39	31.089		44.50	18.413		36.36	21.588		42.44
11.0	16.083	39	71.59 280	31.183	94	44.38 12	18.484	71	34.68 168	21.610	22	39.40 304
21.0	16.170	87	68.75 284	31.316	133	44.22 16	18.592	108	33.03 165	21.686	76	36.33 307
31.0	16.301	131	65.98 277	31.483	167	43.99 23	18.733	141	31.46 157	21.814	128	33.33 300
Feb. 9.9	16.475	174	63.42 256	31.682	199	43.70 29	18.906	173	30.04 142	21.992	178	30.51 282
		213	227		225	38		202	118		224	250
19.9	16.688		61.15 187	31.907		43.32	19.108		28.86 89	22.216		28.01 210
Mar. 1.9	16.937	249	59.28 141	32.158	251	42.84 48	19.333	225	27.97 55	22.482	266	25.91 161
11.9	17.215	278	57.87 87	32.428	270	42.24 60	19.582	249	27.42 18	22.783	301	24.30 105
21.8	17.519	304	57.00 31	32.716	288	41.52 72	19.848	266	27.24 22	23.113	330	23.25 44
31.8	17.841	322	56.69 26	33.020	304	40.70 82	20.129	281	27.46 61	23.466	353	22.81 16
		334			313	91		292			366	
Apr. 10.8	18.175		56.95 83	33.333		39.79 100	20.421		28.07 98	23.832		22.97 76
20.7	18.515	340	57.78 136	33.653	320	38.79 104	20.719	298	29.05 132	24.204	372	23.73 134
30.7	18.855	340	59.14 186	33.975	322	37.75 106	21.019	300	30.37 162	24.573	369	25.07 186
May 10.7	19.184	329	61.00 227	34.294	319	36.70 103	21.314	295	31.99 185	24.929	356	26.93 232
20.7	19.495	311	63.27 263	34.602	308	35.67 98	21.599	285	33.84 204	25.267	338	29.25 271
		290			294			267			308	
30.6	19.785		65.90 289	34.896		34.69 89	21.866		35.88 216	25.575		31.96 302
June 9.6	20.042	257	68.79 310	35.167	271	33.80 78	22.111	245	38.04 222	25.846	271	34.98 322
19.6	20.260	218	71.89 318	35.408	241	33.02 64	22.327	216	40.26 221	26.074	228	38.20 336
29.6	20.436	176	75.07 320	35.615	207	32.38 51	22.510	183	42.47 216	26.254	180	41.56 340
July 9.5	20.565	129	78.27 315	35.782	167	31.87 35	22.653	143	44.63 205	26.381	127	44.96 337
		79			123			101			70	
19.5	20.644	26	81.42 302	35.905	77	31.52 19	22.754	57	46.68 190	26.451	13	48.33 326
29.5	20.670	26	84.44 285	35.982	29	31.33 7	22.811	13	48.58 172	26.464	44	51.59 306
Aug. 8.4	20.644	75	87.29 259	36.011	17	31.26 4	22.824	31	50.30 152	26.420	99	54.65 283
18.4	20.569	121	89.88 230	35.994	61	31.30 15	22.793	71	51.82 129	26.321	148	57.48 251
28.4	20.448	161	92.18 194	35.933	99	31.45 23	22.722	106	53.11 104	26.173	192	59.99 216
Sept. 7.4	20.287		94.12 157	35.834		31.68 26	22.616		54.15 79	25.981		62.15 177
17.3	20.095	192	95.69 116	35.701	133	31.94 28	22.481	135	54.94 53	25.752	229	63.92 133
27.3	19.874	221	96.85 74	35.544	157	32.22 26	22.323	158	55.47 26	25.495	257	65.25 86
Oct. 7.3	19.639	235	97.59 28	35.374	170	32.48 23	22.153	170	55.73 0	25.221	274	66.11 39
17.3	19.399	240	97.87 18	35.200	174	32.71 19	21.979	174	55.73 25	24.940	281	66.50 12
		235			168			168			277	
27.2	19.164		97.69 65	35.032		32.90 15	21.811		55.48 53	24.663		66.38 62
Nov. 6.2	18.943	221	97.04 111	34.880	152	33.05 9	21.657	154	54.95 78	24.401	262	65.76 112
16.2	18.745	198	95.93 153	34.753	127	33.14 5	21.525	132	53.16 101	24.163	238	64.64 159
26.1	18.579	166	94.40 193	34.657	96	33.19 1	21.422	103	51.93 123	23.958	205	63.05 203
Dec. 6.1	18.450	120	92.47 227	34.599	58	33.20 3	21.353	69	51.93 141	23.794	164	61.02 241
		85			17			33			117	
16.1	18.365	40	90.20 255	34.582	25	33.17 6	21.320	6	50.52 156	23.677	67	58.61 272
26.1	18.325	7	87.65 275	34.607	67	33.11 10	21.326	44	48.96 164	23.610	14	55.89 294
36.0	18.332		84.90	34.674		33.01	21.370		47.32	23.596		52.95
Mean Place	17.033		72.00	31.295		41.56	18.817		36.48	22.897		39.24
Sec δ, Tan δ	1.255		+0.758	1.064		-0.363	1.017		+0.184	1.412		+0.997
Dψ α, Dω α	+0.04		-0.02	+0.07		+0.01	+0.06		-0.01	+0.04		-0.03
Dψ δ, Dω δ	+0.2		-0.9	+0.2		-0.9	+0.2		-0.9	+0.2		-0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Sagittæ. Mag. 3.8		$\alpha$ Aquilæ. (Altair.) Mag. 0.9		$\eta$ Aquilæ. Var. 3.7-4.4		$\epsilon$ Draconis. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 43 s	° ' +18 19 "	h m 19 46 s	° ' + 8 38 "	h m 19 48 s	° ' + 0 47 "	h m 19 48 s	° ' +70 3 "
Jan. 1.0	40.696	44.37	43.646	53.37	14.429	29.47	23.64	29.12
11.0	40.758 62	42.31 206	43.719 73	51.82 155	14.503 74	28.36 111	23.52 12	25.86 326
21.0	40.858 100	40.25 206	43.827 108	50.29 153	14.613 110	27.26 110	23.52 0	22.49 337
31.0	40.993 135	38.28 197	43.968 141	48.84 145	14.754 141	26.24 102	23.64 12	19.13 336
Feb. 9.9	41.163 170	36.47 181	44.141 173	47.55 129	14.927 173	25.36 88	23.87 23	15.91 322
	200	154	201	106	200	68	34	293
19.9	41.363	34.93	44.342	46.49	15.127	24.68	24.21	12.98
Mar. 1.9	41.588 225	33.71 122	44.568 226	45.70 79	15.350 223	24.22 46	24.66 45	10.44 254
11.9	41.839 251	32.87 84	44.815 247	45.24 46	15.595 245	24.04 18	25.19 53	8.38 206
21.8	42.109 270	32.47 40	45.082 267	45.15 9	15.859 264	24.16 12	25.79 60	6.89 149
31.8	42.395 286	32.52 5	45.362 280	45.43 28	16.137 278	24.58 42	26.43 64	6.04 55
	297	50	292	66	290	72	68	22
Apr. 10.8	42.692	33.02	45.654	46.09	16.427	25.30	27.11	5.82
20.7	42.996 304	33.96 94	45.953 299	47.09 100	16.725 298	26.30 100	27.79 68	6.27 45
30.7	43.300 304	35.31 135	46.253 300	48.43 134	17.025 300	27.58 128	28.46 67	7.34 107
May 10.7	43.600 300	37.02 171	46.550 297	50.05 162	17.322 297	29.04 146	29.10 64	9.01 167
20.7	43.888 268	39.04 202	46.836 286	51.89 184	17.611 289	30.69 165	29.69 59	11.20 219
	270	224	271	201	274	175	52	266
30.6	44.158	41.28	47.107	53.90	17.885	32.44	30.21	13.86
June 9.6	44.404 246	43.70 242	47.354 247	56.03 213	18.137 252	34.24 180	30.65 44	16.89 303
19.6	44.619 215	46.23 253	47.572 218	58.19 216	18.362 225	36.06 182	30.99 34	20.21 332
29.6	44.799 180	48.78 255	47.758 186	60.35 216	18.555 193	37.83 177	31.24 25	23.74 353
July 9.5	44.939 140	51.30 252	47.905 147	62.43 208	18.710 155	39.50 167	31.37 13	27.38 364
	97	244	106	198	113	157	3	365
19.5	45.036 51	53.74 230	48.010 61	64.41 183	18.823 70	41.07 142	31.40 9	31.03 360
29.5	45.087 6	56.04 210	48.071 16	66.24 165	18.893 26	42.49 123	31.31 19	34.63 345
Aug. 8.4	45.093 38	58.14 189	48.087 26	67.89 144	18.919 17	43.72 106	31.12 30	38.08 325
18.4	45.055 79	60.03 163	48.061 67	69.33 121	18.902 59	44.78 86	30.82 39	41.33 296
28.4	44.976 115	61.66 136	47.994 102	70.54 99	18.843 95	45.64 66	30.43 47	44.29 261
Sept. 7.4	44.861	63.02	47.892	71.53	18.748	46.30	29.96	46.90
17.3	44.716 145	64.06 104	47.760 132	72.26 73	18.623 125	46.77 47	29.41 55	49.12 222
27.3	44.548 168	64.80 74	47.607 153	72.75 49	18.477 146	47.05 28	28.81 60	50.89 177
Oct. 7.3	44.368 180	65.23 43	47.439 168	73.98 23	18.316 161	47.15 10	28.17 64	52.17 128
17.3	44.183 185	65.31 8	47.269 170	72.97 1	18.150 166	47.07 8	27.51 66	52.93 76
	180	24	164	26	161	26	66	21
27.2	44.003	65.07	47.105	72.71	17.989	46.81	26.85	53.14
Nov. 6.2	43.837 166	64.50 57	46.953 152	72.22 49	17.840 149	46.39 42	26.20 65	52.79 35
16.2	43.693 144	63.61 89	46.824 129	71.48 74	17.714 126	45.81 58	25.58 62	51.86 93
26.1	43.578 115	62.41 120	46.723 101	70.54 94	17.616 98	45.08 73	25.03 55	50.39 147
Dec. 6.1	43.496 82	60.94 147	46.656 67	69.38 116	17.552 64	44.22 86	24.54 49	48.41 196
	45	172	31	132	28	97	40	245
16.1	43.451 5	59.22 190	46.625 8	68.06 144	17.524 10	43.25 107	24.14 31	45.96 283
26.1	43.446 35	57.32 202	46.633 45	66.62 153	17.534 48	42.18 111	23.83 19	43.13 314
36.0	43.481	55.30	46.678	65.09	17.582	41.07	23.64	39.99
Mean Place	41.215	43.62	44.024	53.59	14.719	30.35	27.750	23.40
Sec $\delta$ , Tan $\delta$	1.053	+0.331	1.012	+0.152	1.000	+0.014	2.932	+2.756
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.05	-0.01	+0.06	0.00	+0.06	0.00	0.00	-0.08
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	<i>ι</i> Sagittarii. Mag. 4.2			<i>ε</i> Pavonis. Mag. 4.1			<i>β</i> Aquilæ. Mag. 3.9			<i>γ</i> Sagittæ. Mag. 3.7		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	19	49	—42 5	19	50	—73 7	19	51	+ 6 11	19	55	+19 15
	s		"	s		"	s		"	s		"
Jan. 1.1	31.909		19.32	58.82		57.44	13.837		54.90	3.417		58.96
11.0	32.008	99	17.83 149	58.94	12	54.37 307	13.903	66	53.47 143	3.467	50	56.90 206
21.0	32.156	148	16.27 156	59.20	26	51.26 311	14.005	102	52.06 141	3.554	87	54.83 207
31.0	32.350	194	14.68 159	59.57	37	48.19 307	14.140	135	50.72 134	3.679	125	52.83 200
Feb. 9.9	32.583	233	13.09 159	60.07	50	45.22 297	14.307	167	49.54 118	3.837	158	50.98 185
		271	157		59	280		194	98		189	159
19.9	32.854		11.52	60.66		42.42	14.501		48.56	4.026		49.39
Mar. 1.9	33.158	304	10.00 152	61.36	70	39.87 255	14.721	220	47.85 71	4.244	218	48.12 127
11.9	33.488	330	8.54 146	62.13	77	37.59 228	14.962	241	47.44 41	4.487	243	47.23 89
21.8	33.841	353	7.16 138	62.96	83	35.64 195	15.224	262	47.38 6	4.752	265	46.76 47
31.8	34.213	372	5.89 127	63.83	87	34.05 159	15.501	277	47.67 29	5.034	282	46.75 1
		386	114		90	121		290	64		296	45
Apr. 10.8	34.599		4.75	64.73		32.84	15.791		48.31	5.330		47.20
20.7	34.994	395	3.75 100	65.66	93	32.04 80	16.088	297	49.28 97	5.636	306	48.10 90
30.7	35.392	398	2.92 83	66.58	92	31.66 38	16.388	300	50.57 129	5.943	307	49.41 131
May 10.7	35.786	394	2.30 62	67.48	90	31.70 4	16.686	298	52.12 155	6.247	304	51.10 169
20.7	36.170	384	1.88 42	68.35	87	32.17 47	16.974	288	53.87 175	6.541	294	53.11 201
		365	18		81	87		274	190		278	225
30.6	36.535		1.70	69.16		33.04	17.248		55.77	6.819		55.36
June 9.6	36.871	336	1.75 5	69.88	72	34.32 128	17.500	252	57.78 201	7.073	254	57.80 244
19.6	37.173	302	2.05 30	70.53	65	35.95 163	17.724	224	59.82 204	7.297	224	60.36 256
29.6	37.433	260	2.56 51	71.07	54	37.88 193	17.917	193	61.84 202	7.488	191	62.96 260
July 9.5	37.644	211	3.30 74	71.49	42	40.08 220	18.071	154	63.80 196	7.639	151	65.54 258
		157	90		28	238		112	185		107	251
19.5	37.801		4.20	71.77		42.46	18.183		65.65	7.746		68.05
29.5	37.901	100	5.25 106	71.92	15	44.95 249	18.252	69	67.34 169	7.808	62	70.42 237
Aug. 8.4	37.940	39	6.41 116	71.93	1	47.46 251	18.276	24	68.87 153	7.824	16	72.61 219
18.4	37.920	20	7.61 120	71.78	15	49.92 246	18.257	19	70.20 133	7.796	28	74.59 196
28.4	37.846	74	8.79 118	71.52	26	52.23 231	18.197	60	71.30 110	7.725	71	76.31 172
		125	113		39	206		95	89		108	145
Sept. 7.4	37.721		9.92	71.13		54.29	18.102		72.19	7.617		77.76
17.3	37.554	167	10.94 102	70.63	50	56.02 173	17.975	127	72.84 65	7.478	139	78.90 114
27.3	37.355	199	11.79 85	70.05	58	57.35 133	17.826	149	73.28 44	7.315	163	79.73 83
Oct. 7.3	37.134	221	12.40 61	69.41	64	58.22 87	17.662	164	73.47 19	7.137	178	80.24 51
17.3	36.906	228	12.77 37	68.74	67	58.57 85	17.494	168	73.45 2	6.953	184	80.40 16
		223	9		66	19		164	26		181	17
27.2	36.683		12.86	68.08		58.38	17.330		73.19	6.772		80.23
Nov. 6.2	36.477	206	12.67 19	67.46	62	57.66 72	17.179	151	72.72 47	6.604	168	79.73 50
16.2	36.300	177	12.21 46	66.89	57	56.41 125	17.048	131	72.04 68	6.454	150	78.90 83
26.1	36.160	140	11.48 73	66.41	48	54.67 174	16.945	103	71.16 88	6.332	122	77.75 115
Dec. 6.1	36.068	92	10.52 96	66.03	38	52.50 217	16.875	70	70.10 106	6.242	90	76.32 143
		42	117		25	253		34	123		54	168
16.1	36.026		9.35	65.78		49.97	16.841		68.87	6.188		74.64
26.1	36.035	9	8.04 131	65.67	11	47.18 279	16.843	2	67.54 133	6.172	16	72.76 188
36.0	36.098	63	6.61 143	65.69	2	44.20 298	16.883	40	66.13 141	6.195	23	70.74 202
Mean Place	32.212		14.69	60.707		51.67	14.175		55.08	3.931		57.45
Sec <i>δ</i> , Tan <i>δ</i>	1.348		—0.903	3.446		—3.298	1.006		+0.109	1.059		+0.350
D <i>ψ</i> <i>α</i> , D <i>ω</i> <i>α</i>	+0.08		+0.03	+0.14		+0.10	+0.06		0.00	+0.05		—0.01
D <i>ψ</i> <i>δ</i> , D <i>ω</i> <i>δ</i>	+0.2		—0.9	+0.2		—0.9	+0.2		—0.9	+0.2		—0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	C Sagittarii. Mag. 4.6		τ Aquilæ. Mag. 5.6		θ Aquilæ. Mag. 3.4		ο Cygni seq. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 57 s	° ' -27 56 "	h m 20 0 s	° ' + 7 2 "	h m 20 7 s	° ' - 1 3 "	h m 20 10 s	° ' +46 29 "
Jan. 1.1	33.222	33.32	4.806	35.65	1.133	67.00	59.832	26.67
11.0	33.305 83	32.68 64	4.864 58	34.22 143	1.190 57	67.96 96	59.813 19	23.76 29
21.0	33.428 123	31.95 73	4.956 92	32.80 142	1.282 92	68.90 94	59.848 35	20.73 30
31.0	33.588 160	31.18 77	5.083 127	31.45 135	1.407 125	69.76 86	59.937 89	17.70 30
Feb. 10.0	33.780 192	30.35 83	5.241 158	30.26 119	1.563 156	70.48 72	60.080 143	14.81 28
	225	90	186	100	183	55	192	26
19.9	34.005	29.45	5.427	29.26	1.746	71.03	60.272	12.17
Mar. 1.9	34.257 252	28.50 95	5.640 213	28.54 72	1.956 210	71.36 33	60.510 238	9.89 22
11.9	34.532 275	27.49 101	5.875 235	28.11 43	2.189 233	71.44 8	60.790 280	8.05 18
21.8	34.829 297	26.43 106	6.132 257	28.03 8	2.443 254	71.23 21	61.107 317	6.74 13
31.8	35.143 314	25.34 109	6.406 274	28.31 28	2.715 272	70.74 49	61.453 346	6.00 7
	327	111	287	64	286	78	366	1
Apr. 10.8	35.470	24.23	6.693	28.95	3.001	69.96	61.819	5.87
20.8	35.807 337	23.12 111	6.989 296	29.92 97	3.298 297	68.92 104	62.198 379	6.36 4
30.7	36.149 342	22.05 107	7.290 301	31.22 130	3.600 302	67.63 129	62.582 384	7.42 10
May 10.7	36.490 341	21.05 100	7.589 299	32.79 157	3.903 303	66.15 148	62.960 378	9.04 16
20.7	36.823 333	20.14 91	7.880 291	34.57 178	4.200 297	64.51 164	63.324 364	11.15 21
	319	78	278	105	285	174	338	25
30.7	37.142	19.36	8.158	36.52	4.485	62.77	63.662	13.69
June 9.6	37.439 297	18.71 65	8.415 257	38.57 205	4.750 265	60.99 178	63.967 305	16.57 26
19.6	37.707 268	18.24 47	8.647 232	40.67 210	4.991 241	59.21 178	64.232 265	19.73 31
29.6	37.942 235	17.96 28	8.845 198	42.77 210	5.200 209	57.48 173	64.450 218	23.07 33
July 9.5	38.135 193	17.86 10	9.006 161	44.80 203	5.372 172	55.86 162	64.615 165	26.50 84
	147	7	121	193	132	152	108	34
19.5	38.282	17.93	9.127	46.73	5.504	54.34	64.723	29.95
29.5	38.380 98	18.17 24	9.204 77	48.52 179	5.593 89	52.98 136	64.773 50	33.34 33
Aug. 8.5	38.427 47	18.54 37	9.236 32	50.12 160	5.637 44	51.81 117	64.764 9	36.59 32
18.4	38.423 4	19.02 48	9.224 12	51.54 142	5.637 0	50.81 100	64.698 66	39.63 30
28.4	38.372 51	19.58 56	9.171 53	52.73 119	5.594 43	50.00 81	64.578 120	42.41 27
	93	59	89	96	80	61	169	24
Sept. 7.4	38.279	20.17	9.082	53.69	5.514	49.39	64.409	44.86
17.4	38.148 131	20.76 59	8.960 122	54.41 72	5.401 113	48.96 43	64.199 210	46.94 20
27.3	37.989 159	21.31 55	8.815 145	54.91 50	5.264 137	48.72 24	63.957 242	48.61 16
Oct. 7.3	37.813 176	21.78 47	8.654 161	55.16 25	5.110 154	48.64 8	63.690 267	49.83 12
17.3	37.628 185	22.14 36	8.487 167	55.18 2	4.949 161	48.72 8	63.410 280	50.57 7
	182	22	164	21	160	24	282	2
27.2	37.446	22.36	8.323	54.97	4.789	48.96	63.128	50.82
Nov. 6.2	37.280 166	22.46 10	8.169 154	54.54 43	4.640 149	49.33 37	62.854 274	50.55 2
16.2	37.135 145	22.42 4	8.035 134	53.88 66	4.509 131	49.84 51	62.599 255	49.77 7
26.2	37.023 112	22.23 19	7.928 107	53.02 86	4.405 104	50.49 65	62.370 229	48.49 12
Dec. 6.1	36.947 76	21.91 32	7.852 76	51.98 104	4.331 74	51.25 76	62.177 193	46.74 17
	34	42	43	121	42	85	152	21
16.1	36.913	21.49	7.809	50.77	4.289	52.10	62.025	44.57
26.1	36.923 10	20.98 51	7.803 6	49.44 133	4.285 4	53.02 92	61.921 104	42.03 2
36.1	36.976 53	20.38 60	7.835 32	48.03 141	4.317 32	53.99 97	61.868 53	39.24 2
Mean Place	33.406	29.64	5.136	35.37	1.371	66.48	61.132	20.71
Sec δ, Tan δ	1.132	-0.530	1.008	+0.124	1.000	-0.019	1.452	+1.053
D <sub>δ</sub> α, D <sub>α</sub> α	+0.07	+0.02	+0.06	0.00	+0.06	0.00	+0.04	-0.04
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Cephei. Mag. 4.4		24 Vulpeculae. Mag. 5.4		α² Capricorni. Mag. 3.8		β Capricorni. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 11 s	° ' " +77 27 "	h m 20 13 s	° ' " +24 24 "	h m 20 13 s	° ' " -12 47 "	h m 20 16 s	° ' " -15 2 "
Jan. 1.1	35.66	51.93	13.439	56.29	26.889	72.49	20.858	41.69
11.0	35.32 34	48.85 308	13.465 26	54.08 221	26.947 58	72.73 24	20.914 56	41.81 12
21.0	35.14 18	45.59 326	13.530 65	51.82 226	27.040 93	72.94 21	21.006 92	41.86 5
31.0	35.16 2	42.27 332	13.632 102	49.61 221	27.168 128	73.06 12	21.132 126	41.83 3
Feb. 10.0	35.38 22	39.01 326	13.770 138	47.54 207	27.327 159	73.07 1	21.290 158	41.70 13
	40	306	173	184	186	12	187	28
19.9	35.78	35.95	13.943	45.70	27.513	72.95	21.477	41.42
Mar. 1.9	36.36 58	33.21 274	14.148 205	44.19 151	27.727 214	72.66 29	21.691 214	41.02 40
11.9	37.08 72	30.89 232	14.381 233	43.06 113	27.964 237	72.20 46	21.928 237	40.45 57
21.8	37.92 84	29.09 180	14.641 260	42.37 69	28.224 260	71.55 65	22.188 260	39.70 75
31.8	38.86 94	27.87 122	14.922 281	42.15 22	28.502 278	70.72 83	22.467 279	38.80 90
	101	59	209	28	293	100	296	105
Apr. 10.8	39.87	27.28	15.221	42.43	28.795	69.72	22.763	37.75
20.8	40.90 103	27.34 6	15.531 310	43.20 77	29.101 306	68.56 116	23.069 306	36.56 119
30.7	41.93 103	28.03 69	15.846 315	44.42 122	29.413 312	67.29 127	23.384 315	35.29 127
May 10.7	42.91 98	29.32 129	16.161 315	46.06 164	29.727 314	65.93 136	23.700 316	33.94 135
20.7	43.83 92	31.17 185	16.467 306	48.07 201	30.036 309	64.52 141	24.013 313	32.59 135
	83	236	293	230	298	140	302	136
30.7	44.66	33.53	16.760	50.37	30.334	63.12	24.315	31.23
June 9.6	45.36 70	36.30 277	17.029 269	52.92 255	30.615 281	61.76 136	24.600 285	29.95 128
19.6	45.92 56	39.43 313	17.271 242	55.62 270	30.870 255	60.48 128	24.859 259	28.77 118
29.6	46.34 42	42.81 338	17.477 206	58.41 279	31.094 224	59.33 115	25.089 230	27.71 106
July 9.5	46.59 25	46.37 356	17.644 167	61.22 281	31.283 189	58.30 103	25.284 195	26.79 92
	7	364	122	276	147	87	151	74
19.5	46.66	50.01	17.766	63.98	31.430	57.43	25.435	26.05
29.5	46.57 9	53.66 365	17.842 76	66.63 265	31.532 102	56.75 68	25.541 106	25.48 57
Aug. 8.5	46.32 25	57.22 356	17.871 29	69.11 248	31.588 56	56.22 53	25.602 61	25.08 40
18.4	45.89 43	60.65 343	17.854 17	71.39 228	31.599 11	55.86 36	25.616 14	24.85 23
28.4	45.33 56	63.85 320	17.793 61	73.41 202	31.565 34	55.67 19	25.584 32	24.76 9
	70	291	102	173	74	7	71	5
Sept. 7.4	44.63	66.76	17.691	75.14	31.491	55.60	25.513	24.81
17.4	43.80 83	69.32 256	17.556 135	76.58 144	31.383 108	55.64 4	25.405 108	24.95 14
27.3	42.89 91	71.47 215	17.394 162	77.67 109	31.248 135	55.78 14	25.272 133	25.18 23
Oct. 7.3	41.89 100	73.16 169	17.215 179	78.40 73	31.095 153	56.00 22	25.119 153	25.45 27
17.3	40.85 104	74.36 120	17.026 189	78.77 37	30.933 162	56.26 26	24.956 163	25.75 30
	107	67	190	0	161	29	163	31
27.2	39.78	75.03	16.836	78.77	30.772	56.55	24.793	26.06
Nov. 6.2	38.72 106	75.14 11	16.655 181	78.39 38	30.621 151	56.86 31	24.640 153	26.36 30
16.2	37.69 103	74.67 47	16.491 164	77.65 74	30.487 134	57.18 32	24.504 136	26.65 29
26.2	36.72 97	73.63 104	16.350 141	76.54 111	30.380 107	57.51 33	24.395 109	26.92 27
Dec. 6.1	35.84 88	72.05 158	16.240 110	75.11 143	30.304 76	57.84 33	24.316 79	27.17 25
	77	209	76	173	42	33	45	22
16.1	35.07	69.96	16.164	73.38	30.262	58.17	24.271	27.39
26.1	34.45 62	67.42 254	16.124 40	71.41 197	30.257 5	58.48 31	24.264 7	27.58 19
36.1	33.98 47	64.51 291	16.123 1	69.25 216	30.289 32	58.77 29	24.295 31	27.73 15
Mean Place	42.531	43.18	14.008	53.00	27.046	70.54	21.000	39.49
Sec δ, Tan δ	4.607	+4.497	1.098	+0.454	1.026	-0.227	1.035	-0.269
Dψ α, Dω α	-0.04	-0.16	+0.05	-0.02	+0.07	+0.01	+0.07	+0.01
Dψ δ, Dω δ	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Cygni. Mag. 4.1			θ Cephei. Mag. 4.3			ε Delphini. Mag. 4.0			Groombridge 3241. Mag. 6.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m		° '	h m		° '	h m		° '	h m		° '
	20	25	+30 5	20	28	+62 42	20	29	+11 1	20	30	+72 14
	s		"	s		"	s		"	s		"
Jan. 1.1	59.639		32.45	9.00		62.60	14.572		15.52	18.15		72.41
11.0	59.644	5	30.09 236	8.87	13	59.57 303	14.599	27	13.99 153	17.89	26	69.42 290
21.0	59.687	43	27.65 244	8.82	5	56.36 321	14.660	61	12.43 156	17.74	15	66.21 321
31.0	59.772	85	25.22 243	8.85	3	53.08 328	14.754	94	10.93 150	17.73	1	62.90 331
Feb. 10.0	59.896	124	22.91 231	8.97	12	49.86 322	14.882	128	9.56 137	17.86	13	59.62 328
		162	209		21	303		158			26	312
19.9	60.058		20.82	9.18		46.83	15.040		8.39	18.12		56.50
Mar. 1.9	60.255	197	19.04 178	9.47	29	44.11 272	15.227	187	7.47 92	18.50	38	53.65 285
11.9	60.484	229	17.66 138	9.82	35	41.81 230	15.442	215	6.87 60	18.99	49	51.21 244
21.9	60.744	260	16.73 93	10.24	42	40.01 180	15.681	239	6.63 24	19.57	58	49.26 195
31.8	61.027	283	16.29 44	10.71	47	38.79 122	15.943	262	6.77 14	20.23	66	47.89 137
		305	8		50	60		279			72	77
Apr. 10.8	61.332		16.37	11.21		38.19	16.222		7.29	20.95		47.12
20.8	61.650	318	16.98 61	11.73	52	38.25 6	16.516	294	8.19 90	21.70	75	46.99 —
30.7	61.977	327	18.09 111	12.26	53	38.93 68	16.819	303	9.45 126	22.46	76	47.52 53
May 10.7	62.304	327	19.66 157	12.79	53	40.22 129	17.125	306	11.02 157	23.21	75	48.65 113
20.7	62.625	321	21.64 198	13.30	51	42.08 186	17.426	301	12.84 182	23.92	71	50.36 171
		306	233		47	235		293			65	223
30.7	62.931		23.97	13.77		44.43	17.719		14.89	24.57		52.59
June 9.6	63.216	285	26.59 262	14.19	42	47.22 279	17.994	275	17.08 219	25.15	58	55.28 269
19.6	63.471	255	29.41 282	14.54	35	50.37 315	18.244	250	19.35 227	25.64	49	58.34 306
29.6	63.690	219	32.36 205	14.84	30	53.77 340	18.465	221	21.66 231	26.02	38	61.69 335
July 9.6	63.869	179	35.36 300	15.05	21	57.36 359	18.651	186	23.93 227	26.28	26	65.25 356
		134	300		14	367		145			16	368
19.5	64.003	86	38.36	15.19	5	61.03	18.796	101	26.11	26.44	2	68.93
29.5	64.089	37	41.27 291	15.24	—	64.71 368	18.897	57	28.16 205	26.46	—	72.64 371
Aug. 8.5	64.126	11	44.04 277	15.21	3	68.32 361	18.954	12	30.06 190	26.37	9	76.31 367
18.4	64.115	58	46.60 256	15.10	11	71.77 345	18.966	—	31.75 169	26.16	21	79.84 353
28.4	64.057	101	48.92 232	14.90	20	75.01 324	18.935	31	33.22 147	25.84	32	83.18 334
			203		27	294		71			43	307
Sept. 7.4	63.956		50.95	14.63		77.95	18.864		34.44	25.41		86.25
17.4	63.821	135	52.65 170	14.31	32	80.54 259	18.759	105	35.42 98	24.89	52	88.98 273
27.3	63.656	165	54.01 136	13.94	37	82.73 219	18.628	131	36.13 71	24.29	60	91.35 237
Oct. 7.3	63.469	187	54.99 98	13.52	42	84.46 173	18.477	151	36.59 46	23.64	65	93.25 190
17.3	63.271	198	55.57 58	13.08	44	85.70 124	18.316	161	36.78 19	22.94	70	94.65 140
		202	17		46	70		164			72	88
27.3	63.069		55.74	12.62		86.40	18.152		36.71	22.22		95.53
Nov. 6.2	62.872	197	55.49 25	12.17	45	86.55 15	17.994	158	36.37 34	21.50	72	95.85 32
16.2	62.690	182	54.83 66	11.73	44	86.14 41	17.850	144	35.79 58	20.79	71	95.59 26
26.2	62.531	159	53.77 106	11.32	41	85.14 100	17.728	122	34.96 83	20.11	68	94.75 84
Dec. 6.1	62.400	131	52.34 143	10.95	37	83.61 153	17.632	96	33.91 105	19.49	62	93.34 141
		100	178		32	203		66			53	193
16.1	62.300		50.56	10.63		81.58	17.566		32.66	18.96		91.41
26.1	62.238	62	48.49 207	10.38	25	79.09 249	17.534	32	31.27 139	18.51	45	89.01 240
36.1	62.215	23	46.21 228	10.21	17	76.25 284	17.536	2	29.77 150	18.17	34	86.22 279
Mean Place	60.298		27.48	11.516		53.24	14.877		13.40	22.523		62.00
Sec δ, Tan δ	1.156		+0.579	2.181		+1.939	1.019		+0.195	3.280		+3.124
Dψ α, Dω α	+0.05		−0.02	+0.02		−0.08	+0.06		−0.01	0.00		−0.13
Dψ δ, Dω δ	+0.2		−0.8	+0.2		−0.8	+0.2		−0.8	+0.2		−0.8



**FOR THE UPPER TRANSIT AT WASHINGTON.**







FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cygni. Mag. 4.0			α Octantis. Mag. 5.2			γ Microscopii. Mag. 4.7			θ Capricorni. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	20	54	+40 50	20	54	-77 20	20	56	-32 34	21	1	-17 33
	s		"	s		"	s		"	s		"
Jan. 1.1	3.822		57.96	40.26		40.25	12.222		63.38	16.993		50.79
11.1	3.771	51	55.42 254	40.08	18	37.15 310	12.239	17	62.45 93	17.007	14	50.72 7
21.0	3.766	5	52.73 269	40.07	1	33.84 331	12.294	55	61.37 108	17.053	46	50.55 17
31.0	3.806	40	49.98 275	40.24	17	30.43 341	12.387	93	60.14 123	17.134	81	50.25 30
Feb. 10.0	3.893	87	47.28 270	40.56	32	26.98 345	12.519	132	58.80 134	17.247	113	49.83 42
		133	253		48	340		166	144		143	57
20.0	4.026		44.75	41.04		23.58	12.685		57.36	17.390		49.26
Mar. 1.9	4.204	178	42.49 226	41.67	63	20.32 326	12.885	200	55.84 152	17.563	173	48.54 72
11.9	4.424	220	40.59 190	42.42	75	17.26 308	13.116	231	54.24 160	17.766	203	47.67 87
21.9	4.684	260	39.14 145	43.29	87	14.46 280	13.377	261	52.59 165	17.995	229	46.64 103
31.9	4.979	295	38.22 92	44.25	96	11.97 249	13.664	287	50.93 168	18.250	255	45.44 120
		323	38		105	213		312	166		277	132
Apr. 10.8	5.302		37.84	45.30		9.84	13.976		49.27	18.527		44.12
20.8	5.647	345	38.03 19	46.40	110	8.11 173	14.308	332	47.66 161	18.824	297	42.69 143
30.8	6.005	358	38.78 75	47.54	114	6.83 128	14.656	348	46.11 155	19.136	312	41.18 151
May 10.7	6.369	364	40.07 129	48.70	116	6.00 83	15.012	356	44.67 144	19.457	321	39.63 155
20.7	6.730	361	41.86 179	49.84	114	5.65 35	15.370	358	43.38 129	19.781	324	38.08 155
		348	222		112	13		353	110		320	151
30.7	7.078		44.08	50.96		5.78	15.723		42.28	20.101		36.57
June 9.7	7.405	327	46.68 260	52.02	100	6.39 61	16.064	341	41.38 90	20.410	309	35.14 143
19.6	7.701	296	49.57 289	52.98	96	7.45 106	16.384	320	40.72 68	20.701	291	33.84 130
29.6	7.960	259	52.69 312	53.84	86	8.94 149	16.674	290	40.31 41	20.965	264	32.71 113
July 9.6	8.175	215	55.95 326	54.57	73	10.82 188	16.926	252	40.16 15	21.198	233	31.75 96
		166	332		58	220		210	10		194	74
19.5	8.341	114	59.27 331	55.15	41	13.02 245	17.136	162	40.26 35	21.392	151	31.01 55
29.5	8.455	59	62.58 322	55.56	23	15.47 263	17.298	110	40.61 57	21.543	104	30.46 34
Aug. 8.5	8.514	6	65.80 307	55.79	4	18.10 272	17.408	57	41.18 75	21.647	57	30.12 12
18.5	8.520	47	68.87 286	55.83	13	20.82 269	17.465	5	41.93 87	21.704	11	30.00 4
28.4	8.473	96	71.73 259	55.70	32	23.51 258	17.470	45	42.80 96	21.715	33	30.04 21
Sept. 7.4	8.377		74.32	55.38		26.09	17.425		43.76	21.682		30.25
17.4	8.238	139	76.59 227	54.88	50	28.47 238	17.334	91	44.76 100	21.608	74	30.57 32
27.4	8.063	175	78.52 193	54.25	63	30.52 205	17.206	128	45.75 99	21.501	107	30.99 42
Oct. 7.3	7.860	203	80.03 151	53.50	75	32.17 165	17.048	158	46.66 91	21.370	131	31.46 47
17.3	7.638	222	81.11 108	52.66	84	33.34 117	16.872	176	47.45 79	21.222	148	31.95 49
		233	63		90	64		185	62		157	48
27.3	7.405		81.74	51.76		33.98	16.687		48.07	21.065		32.43
Nov. 6.2	7.172	233	81.90 16	50.86	90	34.07 9	16.504	183	48.51 44	20.909	156	32.88 45
16.2	6.948	224	81.57 33	49.98	88	33.54 53	16.334	170	48.73 22	20.764	145	33.28 40
26.2	6.741	207	80.76 81	49.16	82	32.44 110	16.183	151	48.73 0	20.637	127	33.61 33
Dec. 6.2	6.556	185	79.49 127	48.43	73	30.79 165	16.061	122	48.51 22	20.533	104	33.86 25
		154	170		60	215		89	43		75	18
16.1	6.402		77.79	47.83		28.64	15.972		48.08	20.458		34.04
26.1	6.285	117	75.71 208	47.39	44	26.07 257	15.920	52	47.43 65	20.414	44	34.13 9
36.1	6.207	78	73.33 238	47.09	30	23.15 292	15.907	13	46.63 80	20.403	11	34.13 0
Mean Place	4.689		49.17	42.416		31.45	12.259		58.56	17.001		48.54
Sec δ, Tan δ	1.322		+0.865	4.563		-4.452	1.187		-0.639	1.049		-0.316
Δα Δα α	+0.04		-0.04	+0.15		+0.20	+0.07		+0.03	+0.07		+0.02
δ	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi$ Cygni. Mag. 3.9		61 Cygni <i>pr.</i> Mag. 5.6		$\nu$ Aquarii. Mag. 4.5		Bradley 2777. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 1 s	° ' +43 35 "	h m 21 3 s	° ' +38 20 "	h m 21 5 s	° ' -11 42 "	h m 21 7 s	° ' +77 47 "
Jan. 1.1	53.744	56.51	9.717	34.95	4.434	31.09	5.06	38.68
11.1	53.678	53.98	9.679	32.63	4.444	31.33	4.49	36.06
21.0	53.656	51.26	9.683	30.14	4.485	31.51	4.09	33.10
31.0	53.683	48.46	9.729	27.59	4.558	31.58	3.88	29.93
Feb. 10.0	53.758	45.69	9.820	25.09	4.663	31.52	3.85	26.67
20.0	53.882	43.06	9.955	22.74	4.797	31.29	4.03	23.45
Mar. 1.9	54.054	40.68	10.133	20.67	4.961	30.91	4.40	20.41
11.9	54.271	38.66	10.353	18.95	5.154	30.33	4.94	17.66
21.9	54.532	37.09	10.611	17.66	5.374	29.54	5.65	15.31
31.9	54.830	36.02	10.902	16.88	5.619	28.56	6.49	13.47
Apr. 10.8	55.158	35.50	11.224	16.63	5.889	27.38	7.44	12.18
20.8	55.512	35.57	11.567	16.93	6.177	26.04	8.46	11.50
30.8	55.881	36.20	11.926	17.78	6.481	24.55	9.52	11.46
May 10.7	56.257	37.38	12.291	19.16	6.794	22.97	10.58	12.03
20.7	56.631	39.08	12.655	21.02	7.112	21.32	11.62	13.21
30.7	56.994	41.24	13.007	23.31	7.426	19.67	12.60	14.95
June 9.7	57.334	43.80	13.341	25.96	7.728	18.07	13.50	17.20
19.6	57.644	46.67	13.647	28.91	8.014	16.53	14.28	19.90
29.6	57.917	49.80	13.917	32.06	8.274	15.11	14.92	22.97
July 9.6	58.146	53.11	14.146	35.34	8.502	13.84	15.42	26.32
19.6	58.323	56.48	14.328	38.69	8.694	12.76	15.76	29.89
29.5	58.447	59.87	14.458	42.02	8.843	11.87	15.92	33.59
Aug. 8.5	58.515	63.19	14.537	45.26	8.947	11.18	15.93	37.34
18.5	58.526	66.38	14.564	48.35	9.005	10.69	15.77	41.05
28.4	58.483	69.36	14.539	51.23	9.018	10.41	15.43	44.65
Sept. 7.4	58.389	72.10	14.466	53.85	8.988	10.29	14.95	48.06
17.4	58.250	74.52	14.351	56.16	8.919	10.33	14.33	51.22
27.4	58.072	76.58	14.202	58.11	8.819	10.50	13.57	54.06
Oct. 7.3	57.863	78.24	14.023	59.68	8.693	10.78	12.72	56.51
17.3	57.634	79.47	13.826	60.83	8.551	11.13	11.78	58.52
27.3	57.392	80.24	13.618	61.54	8.401	11.52	10.78	60.04
Nov. 6.3	57.147	80.53	13.409	61.79	8.251	11.95	9.74	61.01
16.2	56.909	80.31	13.207	61.58	8.111	12.39	8.69	61.41
26.2	56.685	79.60	13.020	60.91	7.988	12.82	7.66	61.22
Dec. 6.2	56.485	78.41	12.856	59.79	7.886	13.24	6.68	60.44
16.1	56.314	76.77	12.720	58.26	7.811	13.63	5.78	59.07
26.1	56.179	74.73	12.617	56.37	7.765	13.99	4.99	57.17
36.1	56.082	72.37	12.552	54.17	7.750	14.29	4.33	54.79
Mean Place	54.674	46.67	10.466	26.13	4.447	30.02	11.200	24.11
Sec $\delta$ , Tan $\delta$	1.381	+0.952	1.275	+0.791	1.021	-0.207	4.730	+4.623
$D_{\psi} a$ , $D_{\omega} a$	+0.04	-0.05	+0.05	-0.04	+0.06	+0.01	-0.02	-0.22
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♊ Piscis Australis. Mag. 5.6			♈ Cygni. Mag. 3.4			♉ Cygni. Mag. 3.8			♊ Equulei. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	21	8	-27 57	21	9	+29 53	21	11	+37 41	21	11	+ 4 54
	s		"	s		"	s		"	s		"
Jan. 1.1	22.226		34.99	23.696		16.89	27.964		35.61	40.409		17.22
11.1	22.230	4	34.33 66	23.660	36	14.77 212	27.908	56	33.30 231	40.404	5	16.12 110
21.1	22.271	41	33.53 80	23.659	1	12.50 227	27.891	17	30.81 249	40.430	26	15.01 111
31.0	22.349	78	32.58 95	23.697	38	10.19 231	27.915	24	28.24 257	40.487	57	13.96 105
Feb. 10.0	22.462	113	31.50 108	23.773	76	7.94 225	27.984	69	25.70 254	40.575	88	13.01 96
		145	122		114	209		113	241		119	77
20.0	22.607		30.28	23.887		5.85	28.097		23.29	40.694		12.24
Mar. 1.9	22.786	179	28.94 134	24.040	153	4.00 185	28.251	154	21.12 217	40.843	149	11.68 56
11.9	22.995	209	27.51 143	24.229	189	2.48 152	28.448	197	19.30 182	41.023	180	11.39 29
21.9	23.234	239	25.99 152	24.454	225	1.37 111	28.684	236	17.88 142	41.231	208	11.39 0
31.9	23.502	268	24.40 159	24.711	257	0.72 65	28.956	272	16.96 92	41.465	234	11.72 33
		291	164		283	17		303	40		259	65
Apr. 10.8	23.793		22.76	24.994		0.55	29.259		16.56	41.724		12.37
20.8	24.107	314	21.11 165	25.301	307	0.89 34	29.586	327	16.68 12	42.002	278	13.34 97
30.8	24.436	329	19.49 162	25.624	323	1.73 84	29.930	344	17.36 68	42.297	295	14.62 128
May 10.8	24.777	341	17.93 156	25.956	332	3.04 131	30.284	354	18.55 119	42.603	306	16.16 154
20.7	25.123	346	16.47 146	26.290	334	4.78 174	30.639	355	20.24 169	42.913	310	17.92 176
		343	131		327	212		346	211		305	193
30.7	25.466		15.16	26.617		6.90	30.985		22.35	43.218		19.85
June 9.7	25.799	333	14.03 113	26.928	311	9.32 242	31.315	330	24.85 250	43.514	296	21.89 204
19.6	26.112	313	13.09 94	27.218	290	12.01 269	31.620	305	27.62 277	43.792	278	24.00 211
29.6	26.401	289	12.39 70	27.477	259	14.86 285	31.891	271	30.64 302	44.045	253	26.09 209
July 9.6	26.654	253	11.93 46	27.699	222	17.82 296	32.122	231	33.79 315	44.267	222	28.15 206
		214	20		180	299		186	323		186	196
19.6	26.868	168	11.73 3	27.879	134	20.81 295	32.308	137	37.02 324	44.453	145	30.11 183
29.5	27.036	119	11.76 27	28.013	87	23.76 286	32.445	84	40.26 317	44.598	101	31.94 164
Aug. 8.5	27.155	68	12.03 47	28.100	37	26.62 271	32.529	33	43.43 302	44.699	57	33.58 146
18.5	27.223	18	12.50 63	28.137	11	29.33 249	32.562	18	46.45 283	44.756	13	35.04 124
28.4	27.241	30	13.13 77	28.126	55	31.82 224	32.544	67	49.28 258	44.769	29	36.28 103
Sept. 7.4	27.211		13.90	28.071		34.06	32.477		51.86	44.740		37.31
17.4	27.137	74	14.74 84	27.977	94	36.02 196	32.368	109	54.16 230	44.674	66	38.10 79
27.4	27.025	112	15.60 86	27.848	129	37.65 163	32.222	146	56.10 194	44.577	97	38.68 58
Oct. 7.3	26.885	140	16.44 84	27.692	156	38.92 127	32.046	176	57.67 157	44.455	122	39.03 35
17.3	26.724	161	17.20 76	27.518	174	39.84 92	31.850	196	58.84 117	44.317	138	39.16 13
		170	66		184	52		209	74		146	6
27.3	26.554		17.86	27.334		40.36	31.641		59.58	44.171		39.10
Nov. 6.3	26.383	171	18.38 52	27.147	187	40.47 11	31.429	212	59.87 29	44.023	148	38.83 27
16.2	26.221	162	18.74 36	26.966	181	40.18 29	31.221	208	59.69 18	43.881	142	38.39 44
26.2	26.078	143	18.91 17	26.800	166	39.48 70	31.026	195	59.06 63	43.757	124	37.77 62
Dec. 6.2	25.959	119	18.90 1	26.652	148	38.39 109	30.852	174	57.98 108	43.651	106	36.99 78
		91	20		122	143		150	150		83	91
16.1	25.868		18.70	26.530		36.96	30.702		56.48	43.568		36.08
26.1	25.812	56	18.33 37	26.436	94	35.20 176	30.585	117	54.62 186	43.513	55	35.06 102
36.1	25.792	20	17.79 54	26.376	60	33.18 202	30.502	83	52.45 217	43.486	27	33.97 109
Mean Place	22.207		30.84	24.176		9.03	28.636		26.11	40.506		14.60
Sec δ, Tan δ	1.132		-0.531	1.153		+0.575	1.264		+0.773	1.004		+0.086
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.07		+0.03	+0.05		-0.03	+0.05		-0.04	+0.06		0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ Cygni. Mag. 4.3			θ Microscopii. Mag. 4.9			α Cephei. Mag. 2.6			ι Capricorni. Mag. 4.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	21	14	+39 2	21	15	-41 9	21	16	+62 13	21	17	-17 10
	s		"	s		"	s		"	s		"
Jan. 1.1	8.600		57.08	27.274		46.43	33.96		74.84	37.699		81.38
		64			14			20			2	
11.1	8.536	23	54.74	27.260	30	45.07	33.76	13	72.21	37.697	31	81.33
21.1	8.513	20	52.20	27.290	72	43.49	33.63	5	69.29	37.728	63	81.15
31.0	8.533	63	49.58	27.362	114	41.74	33.58	2	66.17	37.791	94	80.85
Feb. 10.0	8.596	108	46.98	27.476	154	39.85	33.60	11	63.00	37.885	126	80.42
			248			198			310			58
20.0	8.704		44.50	27.630		37.87	33.71		59.90	38.011		79.84
Mar. 1.9	8.857	153	42.27	27.824	194	35.80	33.90	19	56.97	38.167	156	79.08
		197			229			27			186	
11.9	9.054	235	40.36	28.053	266	33.70	34.17	34	54.37	38.353	215	78.17
21.9	9.289	273	38.88	28.319	299	31.59	34.51	41	52.19	38.568	241	77.08
31.9	9.562	306	37.88	28.618	327	29.52	34.92	46	50.51	38.809	268	75.84
			48			200			112			139
Apr. 10.8	9.868		37.40	28.945		27.52	35.38		49.39	39.077		74.45
		330			353			50	50		288	
20.8	10.198	349	37.46	29.298	372	25.62	35.88	52	48.89	39.365	307	72.95
30.8	10.547	358	38.08	29.670	387	23.88	36.40	54	49.00	39.672	317	71.36
May 10.8	10.905	360	39.23	30.057	392	22.33	36.94	53	49.73	39.989	324	69.71
20.7	11.265	351	40.87	30.449	391	20.99	37.47	51	51.06	40.313	323	68.07
			208			107			188			160
30.7	11.616		42.95	30.840		19.92	37.98		52.94	40.636		66.47
June 9.7	11.950	334	45.42	31.220	380		38.46	48	55.31	40.951	315	64.95
		310			359			44	237		298	
19.6	12.260	277	48.19	31.579	331	18.66	38.90	38	58.09	41.249	275	63.55
29.6	12.537	235	51.20	31.910	293	18.51	39.28	31	61.23	41.524	243	62.33
July 9.6	12.772	190	54.37	32.203	248	18.67	39.59	23	64.63	41.767	207	61.28
			325			46			359			84
19.6	12.962	139	57.62	32.451	197	19.13	39.82	15	68.22	41.974	165	60.44
29.5	13.101	87	60.89	32.648	139	19.88	39.97	8	71.92	42.139	120	59.83
Aug. 8.5	13.188	34	64.09	32.787	81	20.87	40.05	0	75.63	42.259	73	59.43
		18			24			9	366		26	
18.5	13.222	66	67.16	32.868	35	22.07	40.05	16	79.29	42.332	19	59.25
28.5	13.204		70.05	32.892		23.40	39.96		351	42.358		59.27
			263			143			332			19
Sept. 7.4	13.138		72.68	32.857		24.83	39.80		86.12	42.339		59.46
		110			85			23	303		59	
17.4	13.028	148	75.02	32.772	131	26.28	39.57	29	89.15	42.280	93	59.79
27.4	12.880	178	77.03	32.641	168	27.67	39.28	33	91.84	42.187	122	60.22
Oct. 7.3	12.702	200	78.65	32.473	192	28.94	38.95	38	94.14	42.065	151	60.72
		214			207			41	186		140	
17.3	12.502		79.87	32.281		30.02	38.57		135	41.925		61.25
			78			87						53
27.3	12.288		80.65	32.074		30.89	38.16		83	41.774		61.78
Nov. 6.3	12.071	217	80.98	31.864	210	31.47	37.75	41	26	41.622	152	62.29
		212			204			42			146	
16.2	11.859	202	80.84	31.660	185	31.74	37.33	41	32	41.476	131	62.75
26.2	11.657	182	80.23	31.475	158	31.71	36.92	39	88	41.345	109	63.14
Dec. 6.2	11.475	156	79.17	31.317	124	31.35	36.53	35	145	41.236	85	63.45
			149			67						21
16.2	11.319		77.68	31.193		30.68	36.18		196	41.151		63.66
26.1	11.194	125	75.82	31.107	86	29.73	35.88	30	239	41.095	56	63.79
36.1	11.104	90	73.61	31.064	43	28.52	35.63	25		41.070	25	63.82
			221			121						3
Mean Place	9.301		47.12	27.288		40.04	36.023		60.93	37.651		79.32
Sec δ, Tan δ	1.288		+0.811	1.328		-0.874	2.147		+1.900	1.047		-0.309
Dψ α, Dω α	+0.05		-0.04	+0.08		+0.04	+0.03		-0.10	+0.07		+0.02
Dψ δ, Dω δ	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7	+0.3		-0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Aquarii. Mag. 3.1		$\beta$ Cephei. Mag. 3.3		$\epsilon$ Aquarii. Mag. 4.8		74 Cygni. Mag. 5.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 27 s	° ' " - 5 55 "	h m 21 27 s	° ' " +70 11 "	h m 21 33 s	° ' " - 8 13 "	h m 21 33 s	° ' " +40 2 "
Jan. 1.1	11.484	72.54	32.60	62.04	20.166	37.15	36.673	36.04
11.1	11.472 12	73.08 54	32.25 35	59.53 251	20.150 16	37.56 41	36.588 85	33.81 223
21.1	11.490 18	73.56 48	32.01 24	56.68 285	20.165 15	37.90 34	36.541 47	31.36 245
31.0	11.537 47	73.94 38	31.86 15	53.58 310	20.207 42	38.12 22	36.536 5	28.77 259
Feb. 10.0	11.615 78	74.18 24	31.82 4	50.36 322	20.281 74	38.22 10	36.574 38	26.19 258
	109	10	9	321	104	6	84	251
20.0	11.724	74.28	31.91	47.15	20.385	38.16	36.658	23.68
Mar. 2.0	11.862 138	74.18 10	32.12 21	44.09 306	20.518 133	37.90 26	36.789 131	21.37 231
11.9	12.031 169	73.85 33	32.43 31	41.29 280	20.683 165	37.44 46	36.964 175	19.37 200
21.9	12.229 198	73.30 55	32.85 42	38.88 241	20.876 193	36.75 69	37.183 219	17.76 161
31.9	12.454 225	72.49 81	33.36 51	36.94 194	21.099 223	35.84 91	37.443 260	16.60 116
	252	104	59	140	249	114	296	66
Apr. 10.8	12.706	71.45	33.95	35.54	21.348	34.70	37.739	15.94
20.8	12.980 274	70.18 127	34.60 65	34.74 80	21.620 272	33.36 134	38.064 325	15.83 11
30.8	13.272 292	68.72 146	35.30 70	34.57 17	21.911 291	31.85 151	38.412 348	16.26 43
May 10.8	13.579 307	67.08 164	36.00 70	35.02 45	22.218 307	30.19 166	38.774 362	17.24 98
20.7	13.891 312	65.34 174	36.69 69	36.07 105	22.532 314	28.44 175	39.141 367	18.71 147
	313	181	68	164	315	181	364	193
30.7	14.204	63.53	37.37	37.71	22.847	26.63	39.505	20.64
June 9.7	14.509 305	61.69 184	38.00 63	39.86 215	23.155 308	24.83 180	39.854 349	22.97 233
19.7	14.800 291	59.88 181	38.57 57	42.47 261	23.451 296	23.08 175	40.182 328	25.64 267
29.6	15.068 268	58.15 173	39.06 49	45.48 301	23.725 274	21.43 165	40.478 296	28.57 293
July 9.6	15.308 240	56.55 160	39.47 41	48.79 331	23.970 245	19.90 153	40.735 257	31.70 313
	204	146	32	355	211	136	214	324
19.6	15.512 165	55.09 128	39.79 20	52.34 370	24.181 172	18.54 116	40.949 164	34.94 328
29.5	15.677 121	53.81 106	39.99 10	56.04 376	24.353 129	17.38 96	41.113 112	38.22 325
Aug. 8.5	15.798 77	52.75 87	40.09 1	59.80 376	24.482 83	16.42 73	41.225 59	41.47 314
18.5	15.875 32	51.88 64	40.08 11	63.56 366	24.565 39	15.69 53	41.284 6	44.61 299
28.5	15.907 11	51.24 45	39.97 22	67.22 350	24.604 4	15.16 31	41.290 44	47.60 277
Sept. 7.4	15.896	50.79	39.75	70.72	24.600	14.85	41.246	50.37
17.4	15.847 49	50.54 8	39.44 31	73.98 326	24.558 42	14.72 13	41.157 89	52.86 249
27.4	15.764 83	50.46 8	39.05 39	76.93 295	24.480 78	14.75 3	41.027 130	55.03 217
Oct. 7.4	15.653 111	50.54 21	38.59 46	79.51 258	24.375 105	14.93 18	40.864 163	56.84 181
17.3	15.525 128	50.75 31	38.06 53	81.65 214	24.248 127	15.22 29	40.677 187	58.27 143
	140	31	56	167	138	38	204	99
27.3	15.385	51.06	37.50	83.32	24.110	15.60	40.473	59.26
Nov. 6.3	15.243 142	51.46 40	36.91 59	84.45 113	23.969 141	16.05 45	40.261 212	59.80 54
16.2	15.105 138	51.93 47	36.30 61	85.02 57	23.831 138	16.54 49	40.048 213	59.87 7
26.2	14.979 126	52.46 53	35.70 60	84.99 3	23.704 127	17.05 51	39.843 205	59.47 40
Dec. 6.2	14.871 108	53.02 56	35.12 58	84.37 62	23.594 110	17.58 53	39.653 190	58.61 86
	86	58	53	120	89	52	168	131
16.2	14.785	53.60	34.59	83.17	23.505	18.10	39.485	57.30
26.1	14.725 60	54.19 59	34.11 48	81.41 176	23.442 63	18.60 50	39.342 143	55.58 172
36.1	14.693 32	54.76 57	33.70 41	79.16 225	23.405 37	19.07 47	39.233 109	53.51 207
Mean Place	11.442	73.11	35.732	46.22	20.090	37.29	37.291	24.51
Sec $\delta$ , Tan $\delta$	1.005	-0.104	2.952	+2.778	1.010	-0.145	1.306	+0.840
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	+0.01	+0.02	-0.15	+0.06	+0.01	+0.05	-0.04
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6	+0.3	-0.8



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Capricorni. Mag. 3.8		ε Pegasi. Mag. 2.5		11 Cephei. Mag. 4.8		δ Capricorni. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 35 s	° ' -17 1 "	h m 21 40 s	° ' + 9 29 "	h m 21 40 s	° ' +70 55 "	h m 21 42 s	° ' -16 29 "
Jan. 1.1	29.794	77.78	6.527	42.70	39.54	61.52	27.841	77.97
11.1	29.776 18	77.74 4	6.497 30	41.47 123	39.14 40	59.17 235	27.818 23	77.97 0
21.1	29.789 13	77.56 18	6.493 4	40.22 125	38.86 28	56.43 274	27.824 6	77.85 12
31.0	29.833 44	77.26 30	6.520 27	38.99 123	38.67 19	53.41 302	27.861 37	77.57 25
Feb. 10.0	29.908 75	76.81 45	6.578 58	37.85 114	38.59 8	50.24 317	27.929 68	77.15 42
20.0	30.015 107	76.19 62	6.665 87	36.85 100	38.64 5	47.04 320	28.026 97	76.56 59
Mar. 2.0	30.152 137	75.40 79	6.786 121	36.06 79	38.82 18	43.95 309	28.156 130	75.79 77
11.9	30.320 168	74.44 96	6.939 153	35.52 54	39.11 29	41.09 286	28.317 161	74.85 94
21.9	30.519 199	73.29 115	7.123 184	35.30 22	39.51 40	38.58 251	28.508 191	73.72 113
31.9	30.746 227	71.99 130	7.338 215	35.41 11	40.01 50	36.51 207	28.730 222	72.42 130
Apr. 10.9	31.002 256	70.55 144	7.580 242	35.87 46	40.60 59	34.96 155	28.980 250	70.97 145
20.8	31.280 278	68.97 158	7.849 269	36.68 81	41.25 65	34.00 96	29.255 275	69.38 159
30.8	31.581 301	67.28 169	8.137 288	37.83 115	41.96 71	33.64 36	29.551 296	67.69 169
May 10.8	31.895 314	65.57 171	8.441 304	39.29 146	42.69 73	33.89 25	29.864 313	65.94 175
20.7	32.217 322	63.83 174	8.752 311	41.02 173	43.41 72	34.78 89	30.187 323	64.18 176
30.7	32.543 326	62.13 170	9.065 313	42.97 195	44.11 70	36.24 146	30.512 325	62.45 173
June 9.7	32.862 319	60.53 160	9.371 306	45.09 212	44.78 67	38.24 200	30.833 321	60.81 164
19.7	33.168 306	59.04 149	9.663 292	47.31 222	45.40 62	40.72 248	31.141 308	59.27 154
29.6	33.453 285	57.72 132	9.934 271	49.58 227	45.94 54	43.62 290	31.430 289	57.90 137
July 9.6	33.710 257	56.59 113	10.176 242	51.84 226	46.40 46	46.82 320	31.690 260	56.72 118
19.6	33.931 221	55.68 91	10.384 208	54.05 221	46.76 36	50.31 349	31.916 226	55.77 95
29.6	34.112 181	55.00 68	10.553 169	56.14 209	47.00 24	53.98 367	32.103 187	55.06 71
Aug. 8.5	34.249 137	54.55 45	10.679 126	58.09 195	47.14 14	57.74 376	32.246 143	54.56 50
18.5	34.339 90	54.34 21	10.761 82	59.85 176	47.18 4	61.52 378	32.343 97	54.32 24
28.5	34.383 44	54.34 0	10.799 38	61.41 156	47.10 8	65.24 372	32.393 50	54.28 4
Sept. 7.4	34.382 1	54.53 19	10.796 3	62.74 133	46.92 18	68.81 357	32.398 5	54.45 17
17.4	34.339 43	54.87 34	10.753 43	63.82 108	46.63 29	72.19 338	32.362 36	54.78 33
27.4	34.260 79	55.33 46	10.676 77	64.67 85	46.26 37	75.27 308	32.289 73	55.23 45
Oct. 7.4	34.150 110	55.87 54	10.573 103	65.27 60	45.81 45	77.99 272	32.185 104	55.78 55
17.3	34.020 130	56.46 59	10.448 125	65.63 36	45.30 51	80.31 232	32.059 126	56.38 60
27.3	33.877 143	57.06 60	10.311 137	65.74 11	44.73 57	82.16 185	31.920 139	56.99 61
Nov. 6.3	33.729 148	57.63 57	10.169 142	65.63 11	44.13 60	83.50 134	31.775 145	57.59 60
16.3	33.585 144	58.15 52	10.029 140	65.28 35	43.51 62	84.28 78	31.633 142	58.14 55
26.2	33.451 134	58.61 46	9.898 131	64.73 55	42.89 62	84.46 18	31.500 133	58.63 49
Dec. 6.2	33.336 115	58.98 37	9.781 117	63.98 75	42.29 60	84.04 42	31.383 117	59.04 41
16.2	33.243 93	59.23 25	9.682 99	63.06 92	41.72 57	83.02 102	31.287 96	59.35 31
26.1	33.176 67	59.39 16	9.607 75	61.98 108	41.21 51	81.45 157	31.216 71	59.55 20
36.1	33.138 38	59.45 6	9.556 51	60.79 119	40.76 45	79.36 209	31.171 45	59.64 9
Mean Place	29.676	75.90	6.553	37.98	42.615	44.50	27.698	76.26
Sec δ, Tan δ	1.046	-0.306	1.014	+0.167	3.061	+2.893	1.043	-0.296
Dψ a, Dω a	+0.07	+0.02	+0.06	-0.01	+0.02	-0.16	+0.06	+0.02
Dψ δ, Dω δ	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi^3$ Cygni. Mag. 4.3			$\mu$ Capricorni. Mag. 5.2			$\gamma$ Gruis. Mag. 3.2			16 Pegasi. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	21	43	+48 55	21	48	-13 56	21	48	-37 44	21	49	+25 31
	s		"	s		"	s		"	s		"
Jan. 1.1	42.658	133	44.43	46.502	27	36.44	54.568	48	87.48	16.890	60	72.39
11.1	42.525	89	42.14	46.475	0	36.56	54.520	10	86.41	16.830	30	70.63
21.1	42.436	40	39.56	46.475	31	36.57	54.510	27	85.09	16.800	1	68.73
31.0	42.396	12	36.80	46.506	60	36.45	54.537	66	83.55	16.801	37	66.76
Feb. 10.0	42.408	66	33.96	46.566	90	36.16	54.603	104	81.82	16.838	72	64.80
	42.474		31.16	46.656		35.71	54.707		79.93	16.910		62.95
Mar. 2.0	42.597	123	28.53	46.778	122	35.07	54.848	141	77.91	17.020	110	61.29
11.9	42.775	178	26.16	46.931	153	34.25	55.027	179	75.79	17.167	147	59.89
21.9	43.006	231	24.17	47.114	183	33.24	55.244	217	73.61	17.350	183	58.85
31.9	43.286	280	22.64	47.329	215	32.02	55.496	252	71.40	17.569	219	58.21
	43.610	324	21.62	47.571	242	30.63	55.781	285	69.21	17.821	252	57.99
Apr. 10.9	43.971	361	21.17	47.840	269	29.09	56.096	315	67.09	18.101	280	58.24
20.8	44.358	387	21.29	48.130	290	27.41	56.436	340	65.05	18.405	304	58.95
May 10.8	44.764	406	21.98	48.438	308	25.66	56.797	361	63.16	18.724	319	60.09
20.7	45.176	412	23.22	48.757	319	23.86	57.170	373	61.47	19.053	329	61.64
	45.585	409	24.98	49.079	322	22.07	57.548	378	60.00	19.384	331	63.54
June 9.7	45.978	393	27.20	49.397	318	20.33	57.922	374	58.81	19.708	324	65.77
19.7	46.347	369	29.82	49.704	307	18.69	58.284	362	57.91	19.708	307	68.23
29.6	46.680	333	32.77	49.993	289	17.18	58.623	339	57.34	20.015	285	70.88
July 9.6	46.971	291	35.96	50.254	261	15.86	58.931	308	57.10	20.300	255	73.64
	47.212	241	39.33	50.483	229	14.75	59.200	269	57.19	20.555	218	76.44
19.6	47.396	184	42.79	50.673	190	13.85	59.423	223	57.60	20.773	176	79.23
29.6	47.523	127	46.28	50.820	147	13.19	59.595	172	58.30	20.949	132	81.95
Aug. 8.5	47.591	68	49.72	50.922	102	12.77	59.713	118	59.25	21.081	85	84.52
18.5	47.599	8	53.03	50.978	56	12.58	59.775	62	60.43	21.166	39	86.94
28.5		50			12			6		21.205	6	
Sept. 7.4	47.549		56.14	50.990		12.58	59.781		61.74	21.205		89.12
17.4	47.447	102	59.01	50.960	30	12.77	59.736	45	63.15	21.199	46	91.05
27.4	47.299	148	61.57	50.892	68	13.10	59.646	90	64.58	21.153	83	92.70
Oct. 7.4	47.112	187	63.76	50.796	96	13.54	59.516	130	65.96	21.070	114	94.04
17.3	46.892	220	65.55	50.676	120	14.06	59.355	161	67.23	20.956	136	95.04
	46.651	241	66.89	50.542	134	14.63	59.176	179	68.31	20.820	151	95.70
27.3	46.396	255	67.75	50.402	140	15.20	58.986	190	69.18	20.669	160	96.01
Nov. 6.3	46.135	261	68.10	50.262	140	15.75	58.797	189	69.78	20.509	161	96.5
16.3	45.880	255	67.93	50.131	131	16.27	58.618	179	70.08	20.348	156	95.96
26.2	45.637	243	67.24	50.015	116	16.73	58.457	161	70.08	20.192	143	95.54
Dec. 6.2		222			97			137		20.049	127	94.77
	45.415		66.04	49.918		17.12	58.320		69.77	19.922		93.68
16.2	45.221	194	64.38	49.845	73	17.42	58.213	107	69.15	19.817	105	92.29
26.1	45.062	159	62.29	49.796	49	17.62	58.140	73	68.25	19.738	79	90.64
36.1												
Mean Place	43.539		30.44	46.341		35.42	54.415		81.18	17.082		63.21
Sec $\delta$ , Tan $\delta$	1.522		+1.147	1.030		-0.248	1.265		-0.774	1.108		+0.478
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.04		-0.06	+0.06		+0.01	+0.07		+0.04	+0.05		-0.03
D $\psi$ $\delta$ , D $\omega$ $\delta$	+0.3		-0.6	+0.3		-0.5	+0.3		-0.5	+0.3		-0.5





FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Aquarii. Mag. 4.4			20 Cephei. Mag. 5.4			♋ Gruiis. Mag. 2.2			♌ Pegasi. Mag. 4.0		
	Right Ascension		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	22	1	-14 15	22	2	+62 22	22	3	-47 21	22	3	+24 56
	s		"	s		"	s		"	s		"
Jan. 1.1	57.582		83.36	27.56		66.88	0.630		57.66	8.673		30.90
11.1	57.543	39	83.48	27.29	27	64.71	0.544	86	56.19	8.605	68	29.24
21.1	57.531	12	83.47	27.08	21	62.14	0.499	45	54.41	8.564	41	27.44
31.1	57.548	17	83.32	26.94	14	59.29	0.498	1	52.36	8.554	10	25.56
Feb. 10.0	57.593	45	83.00	26.88	6	56.26	0.542	44	50.11	8.578	24	23.67
		76			2			90			59	
20.0	57.669		82.52	26.90		53.18	0.632		47.68	8.637		21.87
Mar. 2.0	57.776	107	81.84	27.00	10	50.18	0.767	135	45.12	8.731	94	20.26
11.9	57.914	138	80.98	27.19	19	47.38	0.947	180	42.50	8.864	133	18.88
21.9	58.085	171	79.91	27.45	26	44.90	1.172	225	39.85	9.035	171	17.84
31.9	58.288	203	78.64	27.79	34	42.84	1.438	266	37.23	9.242	207	17.18
		232			41			306			241	
Apr. 10.9	58.520		77.20	28.20		41.27	1.744		34.69	9.483		16.93
20.8	58.780	260	75.60	28.67	47	40.25	2.087	343	32.26	9.755	272	17.12
30.8	59.064	284	73.88	29.17	50	39.83	2.461	374	30.01	10.052	297	17.76
May 10.8	59.368	304	72.07	29.70	53	40.01	2.860	399	28.00	10.367	315	18.84
20.8	59.685	317	70.22	30.25	55	40.79	3.276	416	26.25	10.695	328	20.32
		323			54			425			332	
30.7	60.008		68.38	30.79		42.15	3.701		24.81	11.027		22.16
June 9.7	60.329	321	66.59	31.32	53	44.05	4.124	423	23.73	11.355	328	24.31
19.7	60.640	311	64.91	31.81	49	46.40	4.536	412	23.01	11.670	315	26.71
29.6	60.935	295	63.36	32.26	45	49.18	4.925	389	22.69	11.963	293	29.30
July 9.6	61.205	270	62.01	32.66	40	52.31	5.282	357	22.76	12.229	266	32.01
		238			32			315			232	
19.6	61.443		60.87	32.98		55.69	5.597		23.21	12.461		34.78
29.6	61.643	200	59.95	33.23	25	59.26	5.861	264	24.03	12.652	191	37.53
Aug. 8.5	61.802	159	59.29	33.41	18	62.94	6.069	208	25.19	12.799	147	40.22
18.5	61.916	114	58.86	33.51	10	66.66	6.215	146	26.61	12.901	102	42.78
28.5	61.984	68	58.67	33.53	2	70.33	6.298	83	28.27	12.957	56	45.19
		23			6			19			10	
Sept. 7.5	62.007		58.69	33.47		73.86	6.317		30.07	12.967		47.37
17.4	61.989	18	58.91	33.33	14	77.21	6.275	42	31.95	12.937	30	49.32
27.4	61.933	56	59.27	33.13	20	80.29	6.176	99	33.82	12.869	68	50.99
Oct. 7.4	61.846	87	59.76	32.88	25	83.04	6.030	146	35.60	12.771	98	52.37
17.3	61.734	112	60.33	32.57	31	85.41	5.846	184	37.20	12.646	125	53.43
		128			35			213			141	
27.3	61.606		60.94	32.22		87.33	5.633		38.57	12.505		54.13
Nov. 6.3	61.470	136	61.56	31.85	37	88.74	5.405	228	39.63	12.354	151	54.50
16.3	61.332	138	62.16	31.46	39	89.62	5.172	233	40.33	12.199	155	54.53
26.2	61.200	132	62.72	31.06	40	89.94	4.945	227	40.64	12.048	151	54.20
Dec. 6.2	61.081	119	63.21	30.66	40	89.67	4.736	209	40.56	11.905	143	53.53
		103			37			185			128	
16.2	60.978		63.62	30.29		88.83	4.551		40.08	11.777		52.54
26.2	60.896	82	63.94	29.95	34	87.42	4.399	152	39.19	11.668	109	51.25
36.1	60.839	57	64.14	29.65	30	85.52	4.283	116	37.94	11.581	87	49.72
Mean Place	57.362		82.40	29.121		49.19	0.476		49.43	8.777		21.20
Sec δ, Tan δ	1.032		-0.254	2.157		+1.912	1.476		-1.086	1.103		+0.465
D <sub>♌</sub> α, D <sub>♌</sub> α	+0.06		+0.01	+0.04		-0.11	+0.08		+0.06	+0.05		-0.03
D <sub>♌</sub> δ, D <sub>♌</sub> δ	+0.3		-0.5	+0.3		-0.5	+0.3		-0.5	+0.3		-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pegasi. Mag. 3.7			$\pi$ Pegasi. Mag. 4.4			$\zeta$ Cephei. Mag. 3.6			$\delta$ Cephei. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m		° '	h m		° '	h m		° '	h m		° '
	22	6	+ 5 47	22	6	+32 46	22	7	+57 47	22	8	+71 55
	s		"	s		"	s		"	s		"
Jan. 1.1	0.934		25.43	17.768		25.73	57.225		47.99	10.08		75.00
11.1	0.887	47	24.44	17.679	89	23.91	57.004	221	45.87	9.61	47	72.95
21.1	0.866	21	23.44	17.620	59	21.85	56.832	172	43.38	9.23	38	70.45
31.1	0.871	5	22.47	17.594	26	19.67	56.718	114	40.61	8.95	28	67.61
Feb. 10.0	0.906	35	21.58	17.605	11	17.45	56.668	50	37.67	8.79	16	64.54
		64			48			17			3	
20.0	0.970		20.85	17.653		15.30	56.685		34.69	8.76		61.37
Mar. 2.0	1.065	95	20.29	17.744	91	13.29	56.775	90	31.78	8.86	10	58.22
12.0	1.194	129	19.99	17.876	132	11.53	56.936	161	29.08	9.08	22	55.24
21.9	1.356	162	19.95	18.050	174	10.09	57.168	232	26.69	9.44	36	52.54
31.9	1.549	193	20.22	18.265	215	9.06	57.465	297	24.71	9.90	46	50.22
		225			252			357			57	
Apr. 10.9	1.774		20.81	18.517		8.47	57.822		23.22	10.47		48.37
20.8	2.027	253	21.71	18.801	284	8.36	58.229	407	22.28	11.11	64	47.06
30.8	2.304	277	22.92	19.114	313	8.74	58.676	447	21.91	11.82	71	46.34
May 10.8	2.599	295	24.40	19.446	332	9.61	59.149	473	22.13	12.57	75	46.23
20.8	2.909	310	26.13	19.791	345	10.94	59.636	487	22.94	13.34	77	46.74
		315			349			488			76	
30.7	3.224		28.04	20.140		12.69	60.124		24.32	14.10		47.84
June 9.7	3.537	313	30.10	20.484	344	14.82	60.600	476	26.22	14.84	74	49.50
19.7	3.839	302	32.24	20.814	330	17.25	61.049	449	28.56	15.53	69	51.67
29.7	4.125	286	34.41	21.121	307	19.94	61.461	412	31.32	16.16	63	54.30
July 9.6	4.385	260	36.55	21.398	277	22.80	61.826	365	34.41	16.70	54	57.31
		230			240			309			44	
19.6	4.615		38.61	21.638		25.77	62.135		37.75	17.14		60.63
29.6	4.807	192	40.56	21.835	197	28.78	62.380	245	41.28	17.49	35	64.19
Aug. 8.5	4.960	153	42.35	21.987	152	31.77	62.557	177	44.89	17.73	24	67.90
18.5	5.069	109	43.94	22.090	103	34.68	62.666	109	48.53	17.86	13	71.69
28.5	5.135	66	45.33	22.144	54	37.45	62.703	37	52.12	17.85	1	75.48
		23			8			31			10	
Sept. 7.5	5.158		46.48	22.152		40.01	62.672		55.57	17.75		79.19
17.4	5.142	16	47.42	22.116	36	42.35	62.576	96	58.83	17.55	20	82.73
27.4	5.091	51	48.11	22.040	76	44.39	62.422	154	61.83	17.24	31	86.05
Oct. 7.4	5.009	82	48.58	21.930	110	46.12	62.215	207	64.49	16.84	40	89.06
17.4	4.906	103	48.83	21.794	136	47.52	61.965	250	66.78	16.36	48	91.71
		121			156			285			54	
27.3	4.785		48.88	21.638		48.53	61.680		68.63	15.82		93.92
Nov. 6.3	4.655	130	48.73	21.469	169	49.16	61.369	311	69.99	15.23	59	95.64
16.3	4.524	131	48.39	21.296	173	49.38	61.044	325	70.83	14.60	63	96.82
26.2	4.397	127	47.89	21.124	172	49.18	60.714	330	71.12	13.96	64	97.42
Dec. 6.2	4.280	117	47.22	20.961	163	48.58	60.389	325	70.85	13.33	63	97.41
		103			151			309			62	
16.2	4.177		46.44	20.810		47.58	60.080		70.02	12.71		96.80
26.2	4.092	85	45.54	20.679	131	46.22	59.795	285	68.65	12.13	58	95.60
36.1	4.029	63	44.56	20.571	108	44.54	59.546	249	66.79	11.61	52	93.84
Mean Place	0.805		20.84	17.996		13.86	58.365		30.65	12.885		55.62
Sec $\delta$ , Tan $\delta$	1.005		+0.101	1.189		+0.644	1.876		+1.588	3.225		+3.066
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06		-0.01	+0.05		-0.04	+0.04		-0.09	+0.02		-0.18
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.3		-0.5	+0.3		-0.5	+0.4		-0.5	+0.4		-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Aquarii. Mag. 4.3		α Tucanæ. Mag. 2.9		γ Aquarii. Mag. 4.0		β Pegasi. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 12 s	° ' " — 8 11 "	h m 22 12 s	° ' " —60 39 "	h m 22 17 s	° ' " — 1 47 "	h m 22 17 s	° ' " +11 47 "
Jan. 1.1	27.539 46	48.32 40	49.49 17	95.38 200	22.420 51	78.50 67	26.094 59	18.17 118
11.1	27.493 21	48.72 31	49.32 12	93.38 235	22.369 28	79.17 62	26.035 35	16.99 123
21.1	27.472 5	49.03 18	49.20 5	91.03 266	22.343 2	79.79 54	26.000 10	15.76 124
31.1	27.477 33	49.21 5	49.15 2	88.37 290	22.341 27	80.33 42	25.990 19	14.52 118
Feb. 10.0	27.510 63	49.26 11	49.17 8	85.47 307	22.368 55	80.75 26	26.009 50	13.34 107
20.0	27.573 93	49.15 31	49.25 14	82.40 316	22.423 86	81.01 8	26.059 83	12.27 90
Mar. 2.0	27.666 126	48.84 53	49.39 20	79.24 320	22.509 119	81.09 15	26.142 116	11.37 65
12.0	27.792 158	48.31 77	49.59 26	76.04 316	22.628 151	80.94 39	26.258 151	10.72 37
21.9	27.950 189	47.54 98	49.85 33	72.88 306	22.779 183	80.55 67	26.409 185	10.35 5
31.9	28.139 221	46.56 121	50.18 38	69.82 291	22.962 216	79.88 92	26.594 217	10.30 29
Apr. 10.9	28.360 250	45.35 142	50.56 43	66.91 269	23.178 245	78.96 119	26.811 248	10.59 66
20.8	28.610 274	43.93 161	50.99 48	64.22 242	23.423 270	77.77 143	27.059 276	11.25 100
30.8	28.884 295	42.32 174	51.47 51	61.80 210	23.693 291	76.34 164	27.335 292	12.25 132
May 10.8	29.179 311	40.58 185	51.98 54	59.70 173	23.984 307	74.70 179	27.627 310	13.57 162
20.8	29.490 317	38.73 191	52.52 55	57.97 182	24.291 314	72.91 193	27.937 317	15.19 187
30.7	29.807 317	36.82 191	53.07 55	56.65 87	24.605 315	70.98 199	28.254 316	17.06 208
June 9.7	30.124 308	34.91 187	53.62 53	55.78 42	24.920 307	68.99 201	28.570 307	19.14 222
19.7	30.432 294	33.04 178	54.15 50	55.36 4	25.227 292	66.98 197	28.877 292	21.36 230
29.7	30.726 270	31.26 164	54.65 46	55.40 50	25.519 269	65.01 189	29.169 268	23.66 233
July 9.6	30.996 241	29.62 147	55.11 42	55.90 93	25.788 240	63.12 176	29.437 238	25.99 230
19.6	31.237 204	28.15 125	55.53 35	56.83 136	26.028 204	61.36 159	29.675 202	28.29 222
29.6	31.441 164	26.90 104	55.88 28	58.19 171	26.232 165	59.77 140	29.877 160	30.51 209
Aug. 8.5	31.605 121	25.86 80	56.16 19	59.90 200	26.397 123	58.37 118	30.037 119	32.60 194
18.5	31.726 76	25.06 58	56.35 11	61.90 220	26.520 79	57.19 96	30.156 76	34.54 173
28.5	31.802 33	24.48 35	56.46 2	64.10 238	26.599 37	56.23 72	30.232 32	36.27 152
Sept. 7.5	31.835 8	24.13 12	56.48 6	66.48 240	26.636 3	55.51 51	30.264 8	37.79 127
17.4	31.827 44	24.01 5	56.42 14	68.88 234	26.633 41	55.00 29	30.256 43	39.06 104
27.4	31.783 76	24.06 22	56.28 21	71.22 219	26.592 71	54.71 10	30.213 75	40.10 78
Oct. 7.4	31.707 100	24.28 35	56.07 26	73.41 193	26.521 95	54.61 7	30.138 98	40.88 54
17.4	31.607 119	24.63 44	55.81 31	75.34 160	26.426 114	54.68 23	30.040 118	41.42 28
27.3	31.488 128	25.07 51	55.50 35	76.94 119	26.312 123	54.91 35	29.922 128	41.70 4
Nov. 6.3	31.360 131	25.58 56	55.15 35	78.13 73	26.189 127	55.26 46	29.794 132	41.74 20
16.3	31.229 127	26.14 58	54.80 35	78.86 24	26.062 125	55.72 55	29.662 130	41.54 41
26.2	31.102 116	26.72 58	54.45 34	79.10 27	25.937 115	56.27 62	29.532 124	41.13 64
Dec. 6.2	30.986 103	27.30 55	54.11 30	78.83 79	25.822 104	56.89 66	29.408 110	40.49 83
16.2	30.883 85	27.85 52	53.81 26	78.04 128	25.718 87	57.55 69	29.298 94	39.66 98
26.2	30.798 63	28.37 46	53.55 22	76.76 172	25.631 66	58.24 69	29.204 76	38.68 114
36.1	30.735	28.83	53.33	75.04	25.565	58.93	29.128	37.54
Mean Place	27.295	49.13	49.495	85.05	22.185	81.22	25.960	11.51
Sec δ, Tan δ	1.010	−0.144	2.042	−1.780	1.000	−0.031	1.022	+0.209
Dψ a, Dω a	+0.06	+0.01	+0.08	+0.11	+0.06	0.00	+0.08	−0.01
Dψ δ, Dω δ	+0.4	−0.5	+0.4	−0.5	+0.4	−0.4	+0.4	−0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Lacertæ. Mag. 4.6		π Aquarii. Mag. 4.6		σ Aquarii. Mag. 4.9		α Lacertæ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 20 s	° ' +51 48 "	h m 22 21 s	° ' + 0 57 "	h m 22 26 s	° ' -11 5 "	h m 22 27 s	° ' +49 "
Jan. 1.2	16.946 184	63.41 198	2.526 54	24.30 77	15.710 56	70.69 26	51.662 175	36.53 1
11.1	16.762 144	61.43 233	2.472 30	23.53 75	15.654 32	70.95 16	51.487 141	34.65 2
21.1	16.618 99	59.10 261	2.442 6	22.78 67	15.622 8	71.11 2	51.346 98	32.40 2
31.1	16.519 46	56.49 277	2.436 22	22.11 58	15.614 21	71.13 13	51.248 50	29.88 2
Feb. 10.0	16.473 10	53.72 281	2.458 50	21.53 43	15.635 48	71.00 33	51.198 3	27.20 2
20.0	16.483 69	50.91 275	2.508 83	21.10 23	15.683 80	70.67 51	51.201 59	24.47 2
Mar. 2.0	16.552 131	48.16 255	2.591 114	20.87 2	15.763 112	70.16 73	51.260 118	21.80 2
12.0	16.683 192	45.61 226	2.705 147	20.85 25	15.875 145	69.43 93	51.378 177	19.30 2
21.9	16.875 250	43.35 188	2.852 180	21.10 51	16.020 178	68.50 116	51.555 235	17.09 1
31.9	17.125 304	41.47 140	3.032 212	21.61 80	16.198 211	67.34 136	51.790 286	15.25 1
Apr. 10.9	17.429 350	40.07 88	3.244 241	22.41 108	16.409 241	65.98 155	52.076 333	13.86 1
20.9	17.779 389	39.19 33	3.485 269	23.49 134	16.650 269	64.43 171	52.409 370	12.98 1
30.8	18.168 416	38.86 24	3.754 289	24.83 158	16.919 291	62.72 183	52.779 401	12.65 1
May 10.8	18.584 434	39.10 80	4.043 305	26.41 176	17.210 308	60.89 190	53.180 419	12.87 1
20.8	19.018 438	39.90 134	4.348 313	28.17 192	17.518 318	58.99 194	53.599 426	13.64 1
30.7	19.456 430	41.24 184	4.661 315	30.09 201	17.836 320	57.05 192	54.025 422	14.94 1
June 9.7	19.886 414	43.08 228	4.976 306	32.10 205	18.156 315	55.13 185	54.447 407	16.74 2
19.7	20.300 384	45.36 267	5.282 293	34.15 205	18.471 300	53.28 174	54.854 390	18.98 2
29.7	20.684 346	48.03 299	5.575 269	36.20 199	18.771 281	51.54 156	55.234 346	21.60 2
July 9.6	21.030 299	51.02 323	5.844 242	38.19 189	19.052 251	49.98 138	55.580 302	24.53 3
19.6	21.329 245	54.25 339	6.086 206	40.08 174	19.303 217	48.60 115	55.882 251	27.70 3
29.6	21.574 188	57.64 348	6.292 167	41.82 154	19.520 178	47.45 92	56.133 196	31.04 3
Aug. 8.6	21.762 127	61.12 350	6.459 125	43.36 135	19.698 135	46.53 66	56.329 138	34.47 3
18.5	21.889 66	64.62 345	6.584 82	44.71 112	19.833 92	45.87 41	56.467 79	37.92 3
28.5	21.955 5	68.07 332	6.666 40	45.83 90	19.925 47	45.46 17	56.546 21	41.32 3
Sept. 7.5	21.960 53	71.39 313	6.706 0	46.73 66	19.972 5	45.29 3	56.567 34	44.61 3
17.4	21.907 105	74.52 288	6.706 37	47.39 45	19.977 32	45.32 23	56.533 86	47.70 2
27.4	21.802 151	77.40 256	6.669 69	47.84 23	19.945 66	45.55 37	56.447 131	50.55 2
Oct. 7.4	21.651 189	79.96 219	6.600 92	48.07 5	19.879 92	45.92 49	56.316 169	53.09 2
17.4	21.462 223	82.15 178	6.508 112	48.12 12	19.787 112	46.41 58	56.147 201	55.29 1
27.3	21.239 244	83.93 132	6.396 122	48.00 29	19.675 124	46.99 62	55.946 224	57.08 1
Nov. 6.3	20.995 260	85.25 83	6.274 126	47.71 41	19.551 129	47.61 64	55.722 239	58.42 1
16.3	20.735 265	86.08 31	6.148 125	47.30 52	19.422 128	48.25 62	55.483 246	59.28 1
26.3	20.470 263	86.39 22	6.023 116	46.78 63	19.294 119	48.87 59	55.237 245	59.63 1
Dec. 6.2	20.207 252	86.17 76	5.907 105	46.15 71	19.175 109	49.46 53	54.992 237	59.47 1
16.2	19.955 234	85.41 127	5.802 90	45.44 75	19.066 92	49.99 45	54.755 220	58.79 1
26.2	19.721 204	84.14 173	5.712 69	44.69 78	18.974 72	50.44 36	54.535 197	57.60 1
36.1	19.517	82.41	5.643	43.91	18.902	50.80	54.338	55.95 1
Mean Place	17.636	46.37	2.291	20.70	15.390	70.87	52.200	19.43
Sec δ, Tan δ	1.618	+1.272	1.000	+0.017	1.019	-0.196	1.551	+1.186
Dψ α, Dω α	+0.05	-0.08	+0.06	0.00	+0.06	+0.01	+0.05	-0.07
Dψ δ, Dω δ	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4

**FOR THE UPPER TRANSIT AT WASHINGTON.**



**FOR THE UPPER TRANSIT AT WASHINGTON.**



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Cephei. Mag. 3.7		λ Aquarii. Mag. 3.8		ρ Indi. Mag. 6.1		δ Aquarii. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 46 s	° ' " +65 45 "	h m 22 48 s	° ' " - 8 0 "	h m 22 48 s	° ' " -70 30 "	h m 22 50 s	° ' " -16 15 "
Jan. 1.2	42.05	70.14	17.530	76.29	53.93	75.09	15.260	46.16
11.1	41.69 36	68.48 166	17.461 69	76.70 41	53.54 39	73.05 204	15.187 73	46.27 11
21.1	41.38 31	66.34 214	17.411 50	77.01 31	53.23 31	70.55 250	15.133 54	46.21 6
31.1	41.12 26	63.80 254	17.384 27	77.19 18	53.01 22	67.68 287	15.103 30	45.95 26
Feb. 10.1	40.95 17	60.98 282	17.381 3	77.22 3	52.88 13	64.50 318	15.098 5	45.51 44
	9	299	26	15	4	339	24	65
20.0	40.86	57.99	17.407	77.07	52.84	61.11	15.122	44.86
Mar. 2.0	40.86 0	54.95 304	17.463 56	76.73 34	52.89 5	57.55 356	15.176 54	44.01 85
12.0	40.96 10	51.98 297	17.550 87	76.18 55	53.04 15	53.94 361	15.264 88	42.95 106
22.0	41.17 21	49.22 276	17.672 122	75.39 79	53.30 26	50.35 359	15.386 122	41.67 126
31.9	41.46 29	46.77 245	17.829 157	74.37 102	53.64 34	46.85 350	15.544 158	40.20 147
	38	204	190	126	43	335	192	165
Apr. 10.9	41.84	44.73	18.019	73.11	54.07	43.50	15.736	38.55
20.9	42.30 46	43.18 155	18.243 224	71.66 145	54.58 51	40.39 311	15.963 227	36.75 180
30.8	42.82 52	42.16 102	18.497 254	70.00 166	55.17 59	37.56 283	16.220 257	34.82 196
May 10.8	43.38 56	41.73 43	18.777 280	68.19 181	55.82 65	35.10 246	16.503 283	32.81 201
20.8	43.98 60	41.89 16	19.077 300	66.27 192	56.51 69	33.04 206	16.809 306	30.77 204
	61	74	313	198	73	161	319	203
30.8	44.59	42.63	19.390	64.29	57.24	31.43	17.128	28.74
June 9.7	45.20 61	43.93 130	19.709 319	62.28 201	57.99 75	30.31 112	17.454 326	26.77 197
19.7	45.79 59	45.76 183	20.026 317	60.32 196	58.73 74	29.70 61	17.778 324	24.92 185
29.7	46.35 56	48.07 231	20.331 305	58.44 188	59.45 72	29.61 9	18.093 315	23.25 167
July 9.7	46.85 50	50.79 272	20.620 289	56.69 175	60.12 67	30.06 45	18.389 296	21.77 146
	45	308	262	156	62	94	271	124
19.6	47.30	53.87	20.882	55.13	60.74	31.00	18.660	20.53
29.6	47.67 37	57.21 334	21.114 232	53.77 136	61.28 54	32.42 142	18.900 240	19.55 96
Aug. 8.6	47.97 30	60.77 356	21.308 194	52.65 112	61.73 45	34.26 184	19.101 201	18.86 69
18.5	48.18 21	64.44 367	21.461 153	51.77 88	62.07 34	36.46 220	19.261 160	18.44 42
28.5	48.30 12	68.16 372	21.572 111	51.15 62	62.29 22	38.94 248	19.377 116	18.30 14
	4	370	68	39	10	267	72	11
Sept. 7.5	48.34	71.86	21.640	50.76	62.39	41.61	19.449	18.41
17.5	48.30 4	75.45 359	21.667 27	50.62 14	62.38 1	44.37 276	19.477 28	18.76 35
27.4	48.18 12	78.86 341	21.655 12	50.68 6	62.23 15	47.11 274	19.465 12	19.30 54
Oct. 7.4	47.99 19	82.02 316	21.610 45	50.93 25	61.97 26	49.72 261	19.419 46	19.99 69
17.4	47.72 27	84.88 286	21.536 74	51.32 39	61.62 35	52.10 238	19.342 77	20.77 75
	32	246	94	50	43	203	100	84
27.4	47.40	87.34	21.442	51.82	61.19	54.13	19.242	21.61
Nov. 6.3	47.04 36	89.35 201	21.332 110	52.40 58	60.69 50	55.74 161	19.125 117	22.45 84
16.3	46.64 40	90.87 152	21.212 120	53.03 63	60.15 54	56.85 111	19.000 126	23.26 81
26.3	46.21 43	91.83 96	21.090 122	53.68 65	59.59 56	57.41 56	18.871 129	24.00 74
Dec. 6.2	45.77 44	92.23 40	20.973 117	54.31 63	59.02 57	57.38 3	18.746 125	24.65 65
	44	20	111	61	53	60	117	52
16.2	45.33	92.03	20.862	54.92	58.49	56.78	18.629	25.17
26.2	44.91 42	91.24 79	20.763 99	55.48 56	57.99 50	55.60 118	18.524 105	25.56 39
36.2	44.51 40	89.89 135	20.679 84	55.97 49	57.55 44	53.87 173	18.435 89	25.78 22
Mean Place	43.309	48.98	17.113	77.70	53.950	63.03	14.807	45.11
Sec δ, Tan δ	2.436	+2.222	1.010	-0.141	2.998	-2.826	1.042	-0.292
D <sub>α</sub> a, D <sub>ω</sub> a	+0.04	-0.14	+0.06	+0.01	+0.08	+0.18	+0.06	+0.02
- δ, D <sub>ω</sub> δ	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3

**FOR THE UPPER TRANSIT AT WASHINGTON.**

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	55 Pegasi. Mag. 4.7			C <sup>2</sup> Aquarii. Mag. 3.8			π Cephei. Mag. 4.6			ι Gruis. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''	h	m	°   '   ''
	23	2	+ 8 57	23	5	-21 36	23	5	+74 56	23	5	-45 4
	s		"	s		"	s		"	s		"
Jan. 1.2	49.746	82	46.07	1.916	89	86.19	13.10	68	42.50	40.447	149	56.35
11.2	49.664	65	45.14	1.827	68	86.14	12.42	60	41.18	40.293	118	55.39
21.1	49.599	45	44.15	1.759	46	85.85	11.82	50	39.31	40.180	85	54.02
31.1	49.554	20	43.17	1.713	21	85.34	11.32	39	36.98	40.095	49	52.30
Feb. 10.1	49.534	6	42.23	1.692	7	84.60	10.93	24	34.27	40.046	9	50.27
20.0	49.540		41.39	1.699		83.64	10.69		31.31	40.037		47.97
Mar. 2.0	49.577	37	40.72	1.738	39	82.45	10.59	10	28.20	40.071	34	45.43
12.0	49.648	71	40.24	1.811	73	81.05	10.65	6	25.09	40.149	78	42.73
22.0	49.752	104	40.02	1.919	108	79.44	10.87	22	22.11	40.274	125	39.91
31.9	49.896	144	40.07	2.063	144	77.66	11.23	36	19.36	40.445	171	37.01
		180			183			51			218	
Apr. 10.9	50.076		40.43	2.246		75.73	11.74		16.96	40.663		34.11
20.9	50.291	215	41.11	2.464	218	73.67	12.39	65	15.00	40.926	263	31.25
30.9	50.538	247	42.10	2.716	252	71.52	13.13	74	13.55	41.230	304	28.49
May 10.8	50.812	274	43.40	2.996	280	69.33	13.95	82	12.67	41.571	341	25.91
20.8	51.109	297	44.97	3.302	306	67.15	14.83	88	12.36	41.941	370	23.54
		311			322			91			393	
30.8	51.420		46.76	3.624		65.05	15.74		12.64	42.334		21.45
June 9.7	51.738	318	48.73	3.955	331	63.05	16.66	92	13.51	42.739	405	19.69
19.7	52.056	318	50.85	4.288	333	61.21	17.55	89	14.95	43.147	408	18.28
29.7	52.363	307	53.04	4.615	327	59.59	18.40	85	16.90	43.548	401	17.29
July 9.7	52.655	292	55.24	4.925	310	58.21	19.18	78	19.32	43.931	383	16.72
		267			287			68			355	
19.6	52.922		57.42	5.212		57.13	19.86		22.14	44.286		16.59
29.6	53.160	238	59.51	5.467	255	56.35	20.46	60	25.32	44.603	317	16.88
Aug. 8.6	53.362	202	61.48	5.686	219	55.87	20.94	48	28.77	44.874	271	17.59
18.6	53.524	162	63.29	5.864	178	55.72	21.30	36	32.41	45.093	219	18.69
28.5	53.645	121	64.89	5.997	133	55.87	21.54	24	36.18	45.255	162	20.11
		80			88			9			102	
Sept. 7.5	53.725		66.29	6.085		56.28	21.63		39.99	45.357		21.82
17.5	53.765	40	67.45	6.129	44	56.94	21.61	2	43.77	45.398	41	23.73
27.4	53.768	3	68.39	6.131	2	57.78	21.46	15	47.43	45.382	16	25.75
Oct. 7.4	53.736	32	69.07	6.094	37	58.77	21.18	28	50.91	45.313	69	27.81
17.4	53.676	60	69.54	6.025	69	59.84	20.81	37	54.13	45.198	115	29.82
		83			95			48			154	
27.4	53.593		69.77	5.930		60.93	20.33		57.00	45.044		31.68
Nov. 6.3	53.494	99	69.80	5.815	115	62.00	19.77	56	59.46	44.862	182	33.31
16.3	53.383	111	69.63	5.689	126	62.99	19.13	64	61.45	44.660	202	34.66
26.3	53.267	116	69.27	5.556	133	63.86	18.44	69	62.89	44.447	213	35.64
Dec. 6.3	53.150	117	68.74	5.424	132	64.57	17.70	74	63.76	44.236	211	36.22
		113			126			75			205	
16.2	53.037		68.06	5.298		65.10	16.95		64.02	44.031		36.38
26.2	52.931	106	67.25	5.182	116	65.41	16.21	74	63.66	43.841	190	36.11
36.2	52.837	94	66.34	5.080	102	65.51	15.50	71	62.69	43.674	167	35.41
Mean Place	49.342		38.97	1.376		83.65	15.234		19.07	39.922		47.69
Sec δ, Tan δ	1.012		+0.158	1.076		-0.396	3.850		+3.718	1.432		-1.02
D <sub>α</sub> , D <sub>α</sub> α	+0.06		-0.01	+0.06		+0.03	+0.04		-0.24	+0.07		+0.07
+δ, D <sub>α</sub> δ	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	59 Pegasi. Mag. 5.2		5 H <sup>1</sup> . Cassiopeiæ. Mag. 5.6		φ Aquarii. Mag. 4.4		ψ Aquarii. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 7 s	° ' " + 8 16 "	h m 23 9 s	° ' " +56 42 "	h m 23 10 s	° ' " − 6 29 "	h m 23 11 s	° ' " − 9 31 "
Jan. 1.2	33.156 84	16.17 91	16.539 252	56.74 145	1.974 81	45.88 47	33.208 82	82.75 39
11.2	33.072 67	15.26 94	16.287 221	55.29 189	1.893 67	46.35 38	33.126 65	83.14 24
21.1	33.005 49	14.32 95	16.066 181	53.40 227	1.826 44	46.73 26	33.061 46	83.38 11
31.1	32.956 24	13.37 89	15.885 131	51.13 256	1.782 22	46.99 12	33.015 23	83.49 6
Feb. 10.1	32.932 1	12.48 79	15.754 73	48.57 273	1.760 2	47.11 6	32.992 2	83.43 25
20.0	32.933 33	11.69 63	15.681 6	45.84 279	1.762 33	47.05 26	32.994 33	83.18 44
Mar. 2.0	32.966 66	11.06 43	15.675 62	43.05 274	1.795 66	46.79 49	33.027 65	82.74 67
12.0	33.032 102	10.63 19	15.737 136	40.31 255	1.861 98	46.30 69	33.092 97	82.07 89
22.0	33.134 137	10.44 10	15.873 206	37.76 228	1.959 135	45.61 95	33.189 135	81.18 113
31.9	33.271 176	10.54 38	16.079 276	35.48 191	2.094 171	44.66 118	33.324 172	80.05 134
Apr. 10.9	33.447 211	10.92 71	16.355 339	33.57 146	2.265 208	43.48 141	33.496 206	78.71 155
20.9	33.658 243	11.63 102	16.694 393	32.11 94	2.473 239	42.07 163	33.702 238	77.16 173
30.9	33.901 271	12.65 130	17.087 438	31.17 41	2.712 267	40.44 176	33.940 269	75.43 188
May 10.8	34.172 294	13.95 158	17.525 470	30.76 15	2.979 291	38.68 190	34.209 291	73.55 198
20.8	34.466 310	15.53 179	17.995 491	30.91 70	3.270 307	36.78 201	34.500 309	71.57 204
30.8	34.776 318	17.32 196	18.486 497	31.61 123	3.577 317	34.77 203	34.809 318	69.53 204
June 9.7	35.094 318	19.28 211	18.983 490	32.84 174	3.894 318	32.74 202	35.127 320	67.49 200
19.7	35.412 309	21.39 218	19.473 469	34.58 219	4.212 312	30.72 194	35.447 315	65.49 191
29.7	35.721 294	23.57 220	19.942 439	36.77 258	4.524 295	28.78 182	35.762 299	63.58 176
July 9.7	36.015 269	25.77 215	20.381 397	39.35 292	4.819 273	26.96 166	36.061 278	61.82 156
19.6	36.284 241	27.92 206	20.778 348	42.27 318	5.092 246	25.30 149	36.339 248	60.26 135
29.6	36.525 205	29.98 194	21.126 291	45.45 336	5.338 209	23.81 124	36.587 214	58.91 110
Aug. 8.6	36.730 167	31.92 177	21.417 230	48.81 350	5.547 172	22.57 98	36.801 176	57.81 85
18.6	36.897 126	33.69 157	21.647 165	52.31 354	5.719 133	21.59 75	36.977 134	56.96 56
28.5	37.023 85	35.26 136	21.812 100	55.85 350	5.852 88	20.84 45	37.111 93	56.40 30
Sept. 7.5	37.108 45	36.62 112	21.912 36	59.35 342	5.940 50	20.39 25	37.204 51	56.10 7
17.5	37.153 7	37.74 90	21.948 25	62.77 325	5.990 9	20.14 3	37.255 11	56.03 17
27.4	37.160 27	38.64 65	21.923 81	66.02 302	5.999 23	20.11 19	37.266 24	56.20 35
Oct. 7.4	37.133 55	39.29 43	21.842 133	69.04 274	5.976 55	20.30 37	37.242 53	56.55 50
17.4	37.078 79	39.72 21	21.709 178	71.78 287	5.921 77	20.67 49	37.189 79	57.05 62
27.4	36.999 96	39.93 1	21.531 216	74.15 196	5.844 99	21.16 56	37.110 96	57.67 70
Nov. 6.3	36.903 108	39.94 20	21.315 245	76.11 151	5.745 108	21.72 64	37.014 109	58.37 73
16.3	36.795 114	39.74 36	21.070 269	77.62 100	5.637 113	22.36 67	36.905 116	59.10 73
26.3	36.681 116	39.38 52	20.801 281	78.62 47	5.524 116	23.03 68	36.789 116	59.83 69
Dec. 6.3	36.565 113	38.86 68	20.520 287	79.09 8	5.408 113	23.71 67	36.673 113	60.52 65
16.2	36.452 105	38.18 79	20.233 282	79.01 63	5.295 103	24.38 63	36.560 105	61.17 57
26.2	36.347 95	37.39 88	19.951 269	78.38 115	5.192 94	25.01 56	36.455 94	61.74 48
36.2	36.252	36.51	19.682	77.23	5.098	25.57	36.361	62.22
Mean Place	32.720	9.18	16.897	35.99	1.450	48.06	32.666	83.99
Sec δ, Tan δ	1.011	+0.145	1.822	+1.523	1.006	−0.114	1.014	−0.168
D <sub>+</sub> α, D <sub>−</sub> α	+0.06	−0.01	+0.05	−0.10	+0.06	+0.01	+0.06	+0.01
D <sub>+</sub> δ, D <sub>−</sub> δ	+0.4	−0.2	+0.4	−0.2	+0.4	−0.2	+0.4	−0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tucanæ. Mag. 4.1			γ Piscium. Mag. 3.8			γ Sculptoris. Mag. 4.5			ο Cephei. Mag. 4.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	23	12	−58 40	23	12	+ 2 49	23	14	−32 58	23	15	+67 39
	s		"	s		"	s		"	s		"
Jan. 1.2	36.035		99.83	52.229		48.24	21.281		69.56	11.75		49.02
11.2	35.791	244	98.44 139	52.147	82	47.49 75	21.168	113	69.14 42	11.32	43	47.73 129
21.1	35.588	203	96.59 185	52.081	66	46.75 74	21.075	93	68.39 75	10.93	39	45.92 151
31.1	35.431	157	94.33 226	52.033	48	46.07 68	21.008	67	67.34 106	10.60	33	43.66 226
Feb. 10.1	35.326	105	91.72 261	52.008	25	45.47 60	20.967	41	66.00 134	10.35	25	41.03 263
		49	288		0	48		8	161		16	266
20.1	35.277	—	88.84	52.008		44.99	20.959	—	64.39	10.19		38.17
Mar. 2.0	35.285	8	85.72 312	52.038	30	44.70 29	20.985	26	62.55 184	10.12	7	35.18 299
12.0	35.354	69	82.46 326	52.100	62	44.59 11	21.048	63	60.49 206	10.16	4	32.19 299
22.0	35.485	131	79.12 334	52.197	97	44.74 15	21.150	102	58.26 223	10.30	14	29.31 266
31.9	35.680	195	75.77 335	52.331	134	45.14 40	21.291	141	55.89 237	10.55	25	26.68 263
		255	331		170	69		183	246		35	226
Apr. 10.9	35.935		72.46	52.501		45.83	21.474		53.43	10.90		24.40
20.9	36.249	314	69.28 318	52.707	206	46.78 95	21.697	223	50.91 252	11.34	44	22.54 136
30.9	36.617	368	66.29 299	52.945	238	48.02 124	21.957	260	48.39 252	11.85	51	21.18 82
May 10.8	37.033	416	63.55 274	53.213	268	49.50 148	22.251	294	45.92 247	12.43	58	20.36 25
20.8	37.490	457	61.12 243	53.503	290	51.20 170	22.571	320	43.56 236	13.06	63	20.11 34
		487	206		309	188		341	219		65	
30.8	37.977		59.06	53.812		53.08	22.912		41.37	13.71		20.45
June 9.8	38.482	505	57.42 164	54.128	316	55.08 200	23.267	355	39.38 199	14.37	66	21.37 82
19.7	38.993	511	56.23 119	54.447	319	57.15 207	23.625	358	37.67 171	15.02	65	22.82 146
29.7	39.498	505	55.52 71	54.758	311	59.26 211	23.976	351	36.26 141	15.65	63	24.78 196
July 9.7	39.981	483	55.30 22	55.054	296	61.32 206	24.314	338	35.20 106	16.23	58	27.19 241
		450	29		274	199		314	69		53	289
19.6	40.431		55.59	55.328		63.31	24.628		34.51	16.76		29.99
29.6	40.835	404	56.36 77	55.573	245	65.18 187	24.911	283	34.19 32	17.22	46	33.14 315
Aug. 8.6	41.181	346	57.58 122	55.784	211	66.86 168	25.155	244	34.24 5	17.61	39	36.53 339
18.6	41.460	279	59.21 163	55.958	174	68.36 150	25.355	200	34.66 42	17.90	29	40.11 358
28.5	41.666	206	61.19 198	56.090	132	69.63 127	25.507	152	35.42 76	18.11	21	43.80 369
		127	226		93	104		103	105		12	372
Sept. 7.5	41.793		63.45	56.183		70.67	25.610		36.47	18.23		47.52
17.5	41.840	47	65.88 243	56.235	52	71.47 80	25.663	53	37.76 129	18.27	4	51.20 368
27.5	41.810	30	68.40 252	56.249	14	72.05 58	25.669	6	39.22 146	18.22	5	54.75 355
Oct. 7.4	41.706	104	70.90 250	56.229	20	72.40 35	25.631	38	40.79 157	18.08	14	58.13 338
17.4	41.537	169	73.29 239	56.180	49	72.54 14	25.555	76	42.39 160	17.86	22	61.23 310
		225	216		73	5		108	156		28	277
27.4	41.312		75.45	56.107		72.49	25.447		43.95	17.58		64.00
Nov. 6.3	41.042	270	77.30 185	56.016	91	72.27 22	25.316	131	45.39 144	17.24	34	66.35 235
16.3	40.741	301	78.75 145	55.913	103	71.91 36	25.169	147	46.65 126	16.85	39	68.26 191
26.3	40.423	318	79.75 100	55.804	109	71.43 48	25.013	156	47.68 103	16.42	43	69.63 137
Dec. 6.3	40.099	324	80.25 50	55.692	112	70.84 59	24.855	158	48.43 75	15.96	46	70.44 81
		316	3		109	66		154	46		47	23
16.2	39.783		80.22	55.583		70.18	24.701		48.89	15.49		70.67
26.2	39.486	297	79.66 56	55.480	103	69.44 74	24.557	144	49.01 12	15.02	47	70.30 37
36.2	39.216	270	78.60 106	55.386	94	68.68 76	24.429	128	48.80 21	14.57	45	69.33 97
Mean Place	35.551		88.76	51.731		42.94	20.684		63.88	12.670		26.07
Sec δ, Tan δ	1.924		−1.644	1.001		+0.049	1.192		−0.649	2.631		+2.434
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.07		+0.11	+0.06		0.00	+0.06		+0.04	+0.05		−0.16
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.4		−0.2	+0.4		−0.2	+0.4		−0.2	+0.4		−0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Pegasi. Mag. 4.6			β <sup>1</sup> Aquarii. Mag. 4.2			4 Cassiopeiae. Mag. 5.2			υ Pegasi. Mag. 4.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 23 16	s	° ' "	h m 23 18	s	° ' "	h m 23 21	s	° ' "	h m 23 21	s	° ' "
Jan. 1.2	31.962		20.96	37.369		76.21	8.16		59.47	14.478		61.05
11.2	31.856 <sup>106</sup>		19.77 <sup>119</sup>	37.274 <sup>95</sup>		76.25 <sup>4</sup>	7.84 <sup>32</sup>		58.19 <sup>128</sup>	14.371 <sup>107</sup>		59.90 <sup>115</sup>
21.1	31.764 <sup>92</sup>		18.40 <sup>137</sup>	37.197 <sup>77</sup>		76.05 <sup>20</sup>	7.54 <sup>30</sup>		56.41 <sup>178</sup>	14.278 <sup>93</sup>		58.57 <sup>133</sup>
31.1	31.694 <sup>70</sup>		16.91 <sup>149</sup>	37.139 <sup>58</sup>		75.63 <sup>42</sup>	7.29 <sup>25</sup>		54.20 <sup>221</sup>	14.206 <sup>72</sup>		57.11 <sup>146</sup>
Feb. 10.1	31.647 <sup>47</sup>		15.35 <sup>156</sup>	37.105 <sup>34</sup>		74.97 <sup>66</sup>	7.09 <sup>20</sup>		51.66 <sup>254</sup>	14.156 <sup>50</sup>		55.59 <sup>152</sup>
20.1	31.631 <sup>16</sup>		13.80 <sup>155</sup>	37.098 <sup>7</sup>		74.09 <sup>88</sup>	6.96 <sup>13</sup>		48.90 <sup>276</sup>	14.136 <sup>20</sup>		54.08 <sup>151</sup>
Mar. 2.0	31.648 <sup>17</sup>		12.34 <sup>146</sup>	37.122 <sup>24</sup>		72.96 <sup>113</sup>	6.91 <sup>5</sup>		46.02 <sup>288</sup>	14.150 <sup>14</sup>		52.65 <sup>143</sup>
12.0	31.703 <sup>55</sup>		11.04 <sup>130</sup>	37.179 <sup>57</sup>		71.63 <sup>133</sup>	6.94 <sup>3</sup>		43.15 <sup>287</sup>	14.199 <sup>49</sup>		51.39 <sup>126</sup>
22.0	31.796 <sup>93</sup>		9.98 <sup>106</sup>	37.270 <sup>91</sup>		70.08 <sup>155</sup>	7.06 <sup>12</sup>		40.40 <sup>275</sup>	14.288 <sup>89</sup>		50.34 <sup>105</sup>
31.9	31.932 <sup>136</sup>		9.21 <sup>77</sup>	37.400 <sup>130</sup>		68.34 <sup>174</sup>	7.26 <sup>20</sup>		37.91 <sup>249</sup>	14.419 <sup>131</sup>		49.58 <sup>76</sup>
Apr. 10.9	32.109 <sup>177</sup>		8.76 <sup>45</sup>	37.568 <sup>168</sup>		66.43 <sup>191</sup>	7.55 <sup>29</sup>		35.75 <sup>216</sup>	14.591 <sup>172</sup>		49.14 <sup>44</sup>
20.9	32.326 <sup>217</sup>		8.70 <sup>6</sup>	37.772 <sup>204</sup>		64.38 <sup>206</sup>	7.90 <sup>35</sup>		34.02 <sup>173</sup>	14.804 <sup>213</sup>		49.08 <sup>6</sup>
30.9	32.580 <sup>254</sup>		9.04 <sup>34</sup>	38.010 <sup>238</sup>		62.23 <sup>215</sup>	8.32 <sup>42</sup>		32.78 <sup>124</sup>	15.054 <sup>250</sup>		49.41 <sup>33</sup>
May 10.8	32.863 <sup>283</sup>		9.77 <sup>73</sup>	38.280 <sup>270</sup>		60.03 <sup>220</sup>	8.80 <sup>48</sup>		32.07 <sup>71</sup>	15.334 <sup>280</sup>		50.13 <sup>72</sup>
20.8	33.172 <sup>309</sup>		10.88 <sup>111</sup>	38.577 <sup>297</sup>		57.82 <sup>221</sup>	9.32 <sup>52</sup>		31.92 <sup>15</sup>	15.641 <sup>307</sup>		51.23 <sup>110</sup>
30.8	33.498 <sup>326</sup>		12.34 <sup>146</sup>	38.891 <sup>314</sup>		55.66 <sup>216</sup>	9.86 <sup>54</sup>		32.34 <sup>42</sup>	15.965 <sup>324</sup>		52.66 <sup>143</sup>
June 9.8	33.833 <sup>335</sup>		14.12 <sup>178</sup>	39.218 <sup>327</sup>		53.60 <sup>206</sup>	10.42 <sup>56</sup>		33.32 <sup>98</sup>	16.299 <sup>334</sup>		54.41 <sup>175</sup>
19.7	34.168 <sup>335</sup>		16.17 <sup>205</sup>	39.549 <sup>331</sup>		51.69 <sup>191</sup>	10.97 <sup>55</sup>		34.82 <sup>150</sup>	16.634 <sup>335</sup>		56.44 <sup>203</sup>
29.7	34.495 <sup>327</sup>		18.42 <sup>225</sup>	39.875 <sup>326</sup>		49.98 <sup>171</sup>	11.50 <sup>53</sup>		36.80 <sup>198</sup>	16.962 <sup>328</sup>		58.68 <sup>224</sup>
July 9.7	34.804 <sup>309</sup>		20.84 <sup>242</sup>	40.187 <sup>312</sup>		48.51 <sup>147</sup>	12.00 <sup>50</sup>		39.22 <sup>242</sup>	17.273 <sup>311</sup>		61.06 <sup>238</sup>
19.6	35.091 <sup>287</sup>		23.35 <sup>251</sup>	40.479 <sup>292</sup>		47.32 <sup>119</sup>	12.45 <sup>45</sup>		42.00 <sup>278</sup>	17.562 <sup>289</sup>		63.54 <sup>248</sup>
29.6	35.345 <sup>254</sup>		25.89 <sup>254</sup>	40.742 <sup>263</sup>		46.42 <sup>90</sup>	12.85 <sup>40</sup>		45.10 <sup>310</sup>	17.820 <sup>258</sup>		66.07 <sup>253</sup>
Aug. 8.6	35.563 <sup>218</sup>		28.42 <sup>253</sup>	40.971 <sup>229</sup>		45.85 <sup>57</sup>	13.19 <sup>34</sup>		48.43 <sup>333</sup>	18.043 <sup>223</sup>		68.58 <sup>251</sup>
18.6	35.742 <sup>179</sup>		30.88 <sup>246</sup>	41.160 <sup>189</sup>		45.60 <sup>25</sup>	13.46 <sup>27</sup>		51.94 <sup>351</sup>	18.227 <sup>184</sup>		71.01 <sup>243</sup>
28.5	35.878 <sup>136</sup>		33.22 <sup>234</sup>	41.306 <sup>146</sup>		45.65 <sup>5</sup>	13.65 <sup>19</sup>		55.53 <sup>359</sup>	18.370 <sup>143</sup>		73.33 <sup>232</sup>
Sept. 7.5	35.973 <sup>95</sup>		35.39 <sup>217</sup>	41.407 <sup>101</sup>		46.00 <sup>35</sup>	13.78 <sup>13</sup>		59.14 <sup>361</sup>	18.469 <sup>99</sup>		75.48 <sup>215</sup>
17.5	36.025 <sup>52</sup>		37.37 <sup>198</sup>	41.464 <sup>57</sup>		46.59 <sup>59</sup>	13.83 <sup>5</sup>		62.68 <sup>354</sup>	18.527 <sup>58</sup>		77.45 <sup>197</sup>
27.5	36.038 <sup>13</sup>		39.13 <sup>176</sup>	41.480 <sup>16</sup>		47.40 <sup>81</sup>	13.81 <sup>2</sup>		66.11 <sup>343</sup>	18.546 <sup>19</sup>		79.19 <sup>174</sup>
Oct. 7.4	36.015 <sup>23</sup>		40.63 <sup>150</sup>	41.457 <sup>23</sup>		48.36 <sup>96</sup>	13.73 <sup>8</sup>		69.35 <sup>324</sup>	18.528 <sup>18</sup>		80.69 <sup>150</sup>
17.4	35.962 <sup>53</sup>		41.87 <sup>124</sup>	41.401 <sup>56</sup>		49.43 <sup>107</sup>	13.58 <sup>15</sup>		72.31 <sup>296</sup>	18.480 <sup>48</sup>		81.92 <sup>123</sup>
27.4	35.882 <sup>80</sup>		42.83 <sup>96</sup>	41.317 <sup>84</sup>		50.54 <sup>111</sup>	13.38 <sup>20</sup>		74.93 <sup>262</sup>	18.405 <sup>75</sup>		82.88 <sup>96</sup>
Nov. 6.3	35.782 <sup>100</sup>		43.49 <sup>66</sup>	41.213 <sup>104</sup>		51.64 <sup>110</sup>	13.12 <sup>26</sup>		77.17 <sup>224</sup>	18.310 <sup>95</sup>		83.53 <sup>65</sup>
16.3	35.667 <sup>115</sup>		43.85 <sup>36</sup>	41.093 <sup>120</sup>		52.68 <sup>104</sup>	12.83 <sup>29</sup>		78.95 <sup>178</sup>	18.199 <sup>111</sup>		83.90 <sup>37</sup>
26.3	35.542 <sup>125</sup>		43.91 <sup>6</sup>	40.966 <sup>127</sup>		53.62 <sup>94</sup>	12.51 <sup>32</sup>		80.23 <sup>128</sup>	18.077 <sup>122</sup>		83.97 <sup>7</sup>
Dec. 6.3	35.413 <sup>129</sup>		43.66 <sup>25</sup>	40.837 <sup>129</sup>		54.41 <sup>79</sup>	12.17 <sup>34</sup>		80.97 <sup>74</sup>	17.950 <sup>127</sup>		83.74 <sup>23</sup>
16.2	35.283 <sup>130</sup>		43.13 <sup>53</sup>	40.711 <sup>126</sup>		55.01 <sup>60</sup>	11.81 <sup>36</sup>		81.14 <sup>17</sup>	17.822 <sup>128</sup>		83.23 <sup>51</sup>
26.2	35.158 <sup>125</sup>		42.31 <sup>82</sup>	40.593 <sup>118</sup>		55.43 <sup>42</sup>	11.46 <sup>35</sup>		80.74 <sup>40</sup>	17.697 <sup>125</sup>		82.44 <sup>79</sup>
36.2	35.042 <sup>116</sup>		41.23 <sup>108</sup>	40.485 <sup>108</sup>		55.61 <sup>18</sup>	11.11 <sup>35</sup>		79.76 <sup>98</sup>	17.581 <sup>116</sup>		81.42 <sup>102</sup>
Mean Place	31.586		8.86	36.761		74.07	8.592		37.20	14.067		48.93
Sec δ, Tan δ	1.089		+0.430	1.068		-0.375	2.118		+1.868	1.086		+0.423
D <sub>⊙</sub> α, D <sub>∞</sub> α	+0.06		-0.03	+0.06		+0.02	+0.05		-0.12	+0.06		-0.03
D <sub>⊙</sub> δ, D <sub>∞</sub> δ	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2



**FOR THE UPPER TRANSIT AT**



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cephei. Mag. 3.4		$\kappa$ Andromedæ. Mag. 4.3		$\omega^2$ Aquarii. Mag. 4.6		$\iota^1$ Aquarii. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 35 s	° ' " +77 10 "	h m 23 36 s	° ' " +43 52 "	h m 23 38 s	° ' " -14 59 "	h m 23 39 s	° ' " -18 43 "
Jan. 1.2	54.17	33.91	19.213	45.91	25.846	74.02	54.614	77.35
11.2	53.34 83	33.04 87	19.035 178	44.72 119	25.747 99	74.29 27	54.511 103	77.53 18
21.2	52.56 78	31.57 147	18.873 162	43.15 157	25.660 87	74.38 9	54.420 91	77.48 5
31.1	51.87 69	29.58 199	18.733 140	41.27 188	25.591 69	74.27 11	54.347 73	77.19 29
Feb. 10.1	51.31 56	27.15 243	18.625 108	39.14 213	25.541 50	73.94 33	54.294 53	76.68 51
	41 277		70 227		25 54		27 77	
20.1	50.90	24.38	18.555	36.87	25.516	73.40	54.267	75.91
Mar. 2.0	50.65 25	21.38 300	18.529 26	34.56 231	25.519 3	72.62 78	54.267 0	74.92 99
12.0	50.57 8	18.29 309	18.553 24	32.29 227	25.554 35	71.62 100	54.300 33	73.69 123
22.0	50.69 12	15.24 305	18.630 77	30.19 210	25.624 70	70.39 123	54.368 68	72.24 145
Apr. 1.0	50.99 30	12.33 291	18.763 133	28.32 187	25.731 107	68.94 145	54.474 106	70.57 167
	48 264		189 153		145 166		145 166	
10.9	51.47	9.69	18.952	26.79	25.876	67.28	54.619	68.72
20.9	52.11 64	7.42 227	19.192 240	25.65 114	26.059 183	65.45 183	54.802 183	66.71 201
30.9	52.89 78	5.60 182	19.480 288	24.96 69	26.280 221	63.47 198	55.023 221	64.57 214
May 10.8	53.78 89	4.29 131	19.808 328	24.74 22	26.533 253	61.37 210	55.277 254	62.36 221
20.8	54.76 98	3.54 75	20.171 363	25.01 27	26.813 280	59.21 216	55.559 282	60.11 225
	104 17		385 76		304 217		305 217	
30.8	55.80	3.37	20.556	25.77	27.117	57.04	55.864	57.88
June 9.8	56.87 107	3.78 41	20.955 399	26.99 122	27.434 317	54.91 213	56.184 320	55.74 214
19.7	57.93 106	4.77 99	21.356 401	28.65 166	27.758 324	52.87 204	56.511 327	53.71 208
29.7	58.95 102	6.30 153	21.749 393	30.70 205	28.081 323	50.98 189	56.838 327	51.86 185
July 9.7	59.92 97	8.33 203	22.125 376	33.07 237	28.392 311	49.28 170	57.155 317	50.25 161
	89 249		348 266		295 147		298 147	
19.7	60.81	10.82	22.473	35.73	28.687	47.81	57.453	48.89
29.6	61.60 79	13.70 288	22.786 313	38.59 286	28.955 268	46.62 119	57.727 274	47.84 105
Aug. 8.6	62.27 67	16.91 321	23.059 273	41.62 303	29.193 238	45.71 91	57.969 242	47.10 74
18.6	62.81 54	20.39 348	23.286 227	44.71 309	29.394 201	45.11 60	58.174 205	46.67 43
28.5	63.22 41	24.05 366	23.464 178	47.82 311	29.555 161	44.82 29	58.339 165	46.58 9
	26 378		128 306		118 1		122 1	
Sept. 7.5	63.48	27.83	23.592	50.88	29.673	44.81	58.461	46.79
17.5	63.59 11	31.65 382	23.670 78	53.84 296	29.750 77	45.08 27	58.540 79	47.27 48
27.5	63.56 3	35.43 378	23.701 31	56.64 280	29.787 37	45.57 49	58.578 38	47.99 72
Oct. 7.4	63.38 18	39.09 366	23.686 15	59.22 258	29.788 1	46.28 71	58.578 0	48.89 90
17.4	63.07 31	42.54 345	23.631 55	61.55 233	29.754 34	47.12 84	58.543 35	49.92 108
	45 317		91 201		61 93		64 93	
27.4	62.62	45.71	23.540	63.56	29.693	48.05	58.479	51.03
Nov. 6.4	62.06 56	48.55 284	23.418 122	65.21 165	29.610 83	49.04 99	58.393 86	52.17 114
16.3	61.40 66	50.94 239	23.271 147	66.48 127	29.510 100	50.02 98	58.289 104	53.27 110
26.3	60.65 75	52.84 190	23.103 168	67.32 84	29.399 111	50.95 93	58.172 117	54.28 101
Dec. 6.3	59.84 81	54.18 134	22.922 181	67.72 40	29.281 118	51.79 84	58.050 122	55.17 89
	86 74		189 5		118 71		124 71	
16.2	58.98	54.92	22.733	67.67	29.163	52.50	57.926	55.89
26.2	58.10 88	55.04 12	22.541 192	67.16 51	29.048 115	53.08 58	57.806 120	56.43 54
36.2	57.24 86	54.53 51	22.356 185	66.21 95	28.940 108	53.50 42	57.694 112	56.75 32
Mean Place	55.858	8.83	18.934	27.14	25.143	73.76	53.896	75.92
Sec $\delta$ , Tan $\delta$	4.505	+4.393	1.387	+0.962	1.035	-0.268	1.056	-0.339
$D\psi a$ , $D_{\omega} a$	+0.05	-0.29	+0.06	-0.06	+0.06	+0.02	+0.06	+0.02
$D\psi \delta$ , $D_{\omega} \delta$	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\psi$ Andromedæ. Mag. 5.1		41 H. Cephei. Mag. 5.0		$\delta$ Sculptoris. Mag. 4.6		$\phi$ Pegasi. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 41 s	° ' +45 57 "	h m 23 43 s	° ' +67 20 "	h m 23 44 s	° ' -28 34 "	h m 23 48 s	° ' +18 39 "
Jan. 1.2	55.267	53.08	55.62	67.99	37.001	87.29	16.405	44.77
11.2	55.076 191	51.95 113	55.18 44	67.04 95	36.880 121	87.21 8	16.295 110	43.81 96
21.2	54.899 177	50.41 154	54.77 41	65.56 148	36.772 108	86.81 40	16.194 101	42.71 110
31.1	54.747 152	48.55 186	54.40 37	63.59 197	36.682 90	86.09 72	16.107 87	41.50 121
Feb. 10.1	54.626 121	46.42 213	54.10 30	61.22 237	36.616 66	85.09 100	16.041 66	40.25 125
	83	230	22	269	41	129	43	124
20.1	54.543	44.12	53.88	58.53	36.575	83.80	15.998	39.01
Mar. 2.0	54.506 37	41.75 237	53.75 13	55.66 287	36.566 9	82.25 155	15.988 12	37.86 115
12.0	54.520 14	39.41 234	53.72 3	52.71 295	36.592 26	80.45 180	16.008 22	36.84 102
22.0	54.590 70	37.22 219	53.80 8	49.81 290	36.655 63	78.44 201	16.068 60	36.03 81
Apr. 1.0	54.718 128	35.24 198	53.98 18	47.07 274	36.758 103	76.24 220	16.169 101	35.46 57
	186	165	28	245	144	234	144	26
10.9	54.904	33.59	54.26	44.62	36.902	73.90	16.313	35.20
20.9	55.145 241	32.33 126	54.65 39	42.54 208	37.086 184	71.45 245	16.497 184	35.27 7
30.9	55.436 291	31.51 82	55.11 46	40.91 163	37.311 225	68.94 251	16.720 223	35.68 41
May 10.9	55.769 333	31.16 35	55.65 54	39.78 113	37.572 261	66.43 251	16.979 259	36.45 77
20.8	56.139 370	31.31 15	56.25 60	39.20 58	37.865 293	63.96 247	17.266 287	37.55 110
	394	64	63	1	317	236	311	141
30.8	56.533	31.95	56.88	39.19	38.182	61.60	17.577	38.96
June 9.8	56.943 410	33.07 112	57.54 66	39.74 55	38.515 333	59.41 219	17.901 324	40.66 170
19.7	57.356 413	34.63 156	58.20 66	40.84 110	38.859 344	57.43 198	18.231 330	42.58 192
29.7	57.762 406	36.60 197	58.85 65	42.45 161	39.203 344	55.73 170	18.559 328	44.69 211
July 9.7	58.150 388	38.93 233	59.46 61	44.54 209	39.538 335	54.33 140	18.877 318	46.92 223
	361	262	57	252	318	104	298	231
19.7	58.511	41.55	60.03	47.06	39.856	53.29	19.175	49.23
29.6	58.839 328	44.39 284	60.55 52	49.94 288	40.148 292	52.61 68	19.449 274	51.56 233
Aug. 8.6	59.125 286	47.42 303	61.00 45	53.13 319	40.407 259	52.30 31	19.690 241	53.84 228
18.6	59.364 239	50.54 312	61.35 35	56.53 340	40.627 220	52.37 7	19.896 206	56.05 221
28.6	59.554 190	53.69 315	61.64 29	60.11 358	40.805 178	52.79 42	20.063 167	58.12 207
	138	313	20	365	132	76	127	192
Sept. 7.5	59.692	56.82	61.84	63.76	40.937	53.55	20.190	60.04
17.5	59.779 87	59.85 303	61.96 12	67.43 367	41.022 85	54.59 104	20.277 87	61.76 172
27.5	59.816 37	62.75 290	61.99 3	71.03 360	41.063 41	55.87 128	20.327 50	63.27 151
Oct. 7.4	59.807 9	65.44 269	61.94 5	74.48 345	41.063 0	57.30 143	20.340 13	64.54 127
17.4	59.757 50	67.87 243	61.81 13	77.74 326	41.023 40	58.83 153	20.322 18	65.58 104
	90	213	22	296	73	156	46	79
27.4	59.667	70.00	61.59	80.70	40.950	60.39	20.276	66.37
Nov. 6.4	59.545 122	71.78 178	61.32 27	83.31 261	40.852 98	61.89 150	20.206 70	66.91 54
16.3	59.396 149	73.18 140	61.00 32	85.49 218	40.733 119	63.28 139	20.119 87	67.19 28
26.3	59.223 173	74.15 97	60.62 38	87.19 170	40.600 133	64.50 122	20.017 102	67.23 4
Dec. 6.3	59.036 187	74.66 51	60.20 42	88.36 117	40.460 140	65.49 99	19.905 112	67.01 22
	198	4	44	60	143	71	118	44
16.3	58.838	74.70	59.76	88.96	40.317	66.20	19.787	66.57
26.2	58.635 203	74.28 42	59.30 46	88.95 1	40.177 140	66.64 44	19.668 119	65.89 68
36.2	58.436 199	73.39 89	58.85 45	88.36 59	40.045 132	66.77 13	19.551 117	65.03 86
Mean Place	54.967	33.59	55.971	43.89	36.240	82.88	15.780	33.40
Sec $\delta$ , Tan $\delta$	1.439	+1.034	2.597	+2.396	1.139	-0.545	1.056	+0.338
D $\phi$ a, D $\alpha$ a	+0.06	-0.07	+0.06	-0.16	+0.06	+0.04	+0.06	-0.02
D $\delta$ $\delta$ , D $\alpha$ $\delta$	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1





FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass Merid.	Sidereal Time of Mean Noon.
		h m s	s	° ' "	"	m s	s	' "	m s	h m s
Jan.	1	18 46 47.50	11.041	—23 0 53.2	+12.34	+ 3 40.62	+1.182	16 17.87	1 11.05	18 43 6.28
	2	18 51 12.32	11.027	22 55 43.3	13.48	4 8.82	1.167	16 17.88	1 11.00	18 47 2.84
	3	18 55 36.77	11.010	22 50 6.1	14.61	4 36.63	1.150	16 17.88	1 10.95	18 50 59.39
	4	19 0 0.82	10.998	22 44 1.6	15.75	5 4.05	1.133	16 17.88	1 10.90	18 54 55.95
	5	19 4 24.45	10.975	22 37 30.1	16.87	5 31.04	1.115	16 17.87	1 10.84	18 58 52.51
	6	19 8 47.62	10.956	—22 30 31.9	+17.98	+ 5 57.58	+1.096	16 17.85	1 10.78	19 2 49.07
	7	19 13 10.33	10.936	22 23 7.0	19.09	6 23.66	1.076	16 17.82	1 10.72	19 6 45.63
	8	19 17 32.53	10.914	22 15 15.7	20.18	6 49.23	1.054	16 17.79	1 10.65	19 10 42.18
	9	19 21 54.20	10.892	22 6 58.1	21.27	7 14.29	1.032	16 17.76	1 10.57	19 14 38.74
	10	19 26 15.34	10.869	21 58 14.7	22.35	7 38.80	1.010	16 17.72	1 10.49	19 18 35.30
	11	19 30 35.92	10.845	—21 49 5.4	+23.42	+ 8 2.75	+0.986	16 17.67	1 10.41	19 22 31.86
	12	19 34 55.90	10.820	21 39 30.6	24.47	8 26.12	0.962	16 17.62	1 10.33	19 26 28.42
	13	19 39 15.29	10.794	21 29 30.7	25.52	8 48.89	0.935	16 17.56	1 10.25	19 30 24.97
	14	19 43 34.06	10.768	21 19 5.9	26.55	9 11.04	0.909	16 17.50	1 10.16	19 34 21.53
	15	19 47 52.19	10.741	21 8 16.3	27.57	9 32.55	0.882	16 17.42	1 10.07	19 38 18.09
	16	19 52 9.66	10.714	—20 57 2.4	+28.58	+ 9 53.40	+0.856	16 17.34	1 9.97	19 42 14.65
	17	19 56 26.45	10.685	20 45 24.4	29.58	10 13.58	0.827	16 17.26	1 9.88	19 46 11.21
	18	20 0 42.55	10.656	20 33 22.7	30.56	10 33.08	0.798	16 17.18	1 9.78	19 50 7.76
	19	20 4 57.95	10.626	20 20 57.6	31.53	10 51.85	0.768	16 17.09	1 9.68	19 54 4.32
	20	20 9 12.62	10.596	20 8 9.3	32.48	11 9.92	0.737	16 17.00	1 9.58	19 58 0.88
	21	20 13 26.55	10.564	—19 54 58.4	+33.42	+11 27.25	+0.706	16 16.90	1 9.47	20 1 57.43
	22	20 17 39.72	10.533	19 41 25.3	34.33	11 43.81	0.674	16 16.80	1 9.37	20 5 53.99
	23	20 21 52.11	10.500	19 27 30.1	35.24	11 59.60	0.642	16 16.70	1 9.26	20 9 50.55
	24	20 26 3.72	10.467	19 13 13.4	36.14	12 14.61	0.609	16 16.59	1 9.15	20 13 47.11
	25	20 30 14.52	10.433	18 58 35.6	37.00	12 28.82	0.575	16 16.48	1 9.04	20 17 43.66
	26	20 34 24.50	10.399	—18 43 36.9	+37.86	+12 42.21	+0.541	16 16.37	1 8.93	20 21 40.22
	27	20 38 33.67	10.365	18 28 18.0	38.70	12 54.79	0.507	16 16.25	1 8.81	20 25 36.78
	28	20 42 42.00	10.330	18 12 39.2	39.52	13 6.52	0.472	16 16.13	1 8.70	20 29 33.33
	29	20 46 49.50	10.295	17 56 40.8	40.33	13 17.43	0.438	16 16.00	1 8.59	20 33 29.89
	30	20 50 56.15	10.260	17 40 23.2	41.12	13 27.50	0.403	16 15.88	1 8.47	20 37 26.44
	31	20 55 1.96	10.225	—17 23 46.9	+41.89	+13 36.73	+0.368	16 15.74	1 8.36	20 41 23.00
Feb.	1	20 59 6.93	10.190	17 6 52.3	42.65	13 45.12	0.333	16 15.61	1 8.24	20 45 19.56
	2	21 3 11.07	10.155	16 49 39.7	43.39	13 52.68	0.298	16 15.46	1 8.13	20 49 16.11
	3	21 7 14.36	10.121	16 32 9.5	44.11	13 59.40	0.263	16 15.32	1 8.01	20 53 12.67
	4	21 11 16.83	10.086	16 14 22.2	44.82	14 5.29	0.229	16 15.16	1 7.90	20 57 9.22
	5	21 15 18.48	10.052	—15 56 18.2	+45.51	+14 10.37	+0.195	16 15.00	1 7.79	21 1 5.78
	6	21 19 19.30	10.018	15 37 57.8	46.18	14 14.63	0.161	16 14.83	1 7.67	21 5 2.34
	7	21 23 19.32	9.984	15 19 21.4	46.84	14 18.08	0.127	16 14.66	1 7.56	21 8 58.89
	8	21 27 18.54	9.951	15 0 29.4	47.48	14 20.74	0.094	16 14.49	1 7.45	21 12 55.45
	9	21 31 16.97	9.918	14 41 22.1	48.11	14 22.60	0.061	16 14.31	1 7.34	21 16 52.00
	10	21 35 14.61	9.886	—14 22 0.3	+48.72	+14 23.69	+0.029	16 14.12	1 7.23	21 20 48.56
	11	21 39 11.49	9.854	14 2 23.9	49.30	14 24.01	—0.003	16 13.94	1 7.12	21 24 45.11
	12	21 43 7.60	9.823	13 42 33.6	49.88	14 23.58	0.034	16 13.75	1 7.01	21 28 41.67
	13	21 47 2.98	9.792	13 22 29.6	50.44	14 22.40	0.064	16 13.55	1 6.90	21 32 38.22
	14	21 50 57.62	9.762	13 2 12.4	50.98	14 20.48	0.094	16 13.35	1 6.79	21 36 34.78
	15	21 54 51.54	9.732	—12 41 42.6	+51.50	+14 17.85	—0.124	16 13.14	1 6.68	21 40 31.33
	16	21 58 44.74	9.703	—12 21 0.4	+52.01	+14 14.51	—0.153	16 12.93	1 6.58	21 44 27.89

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
		h m s	s	° ' "	"	m s	s	' "	m s	h m s
eb.	16	21 58 44.74	9.703	−12 21 0.4	+52.01	+14 14.51	−0.153	16 12.93	1 6.58	21 44 27.89
	17	22 2 37.25	9.674	12 0 6.1	52.50	14 10.48	0.182	16 12.72	1 6.48	21 48 24.45
	18	22 6 29.07	9.645	11 39 0.4	52.97	14 5.76	0.211	16 12.51	1 6.38	21 52 21.00
	19	22 10 20.21	9.617	11 17 43.7	53.41	14 0.37	0.239	16 12.29	1 6.28	21 56 17.55
	20	22 14 10.69	9.589	10 56 16.3	53.85	13 54.31	0.266	16 12.07	1 6.18	22 0 14.11
	21	22 18 0.51	9.562	−10 34 38.6	+54.27	+13 47.59	−0.293	16 11.85	1 6.09	22 4 10.66
	22	22 21 49.70	9.536	10 12 51.2	54.67	13 40.24	0.320	16 11.63	1 5.99	22 8 7.21
	23	22 25 38.24	9.509	9 50 54.5	55.06	13 32.25	0.346	16 11.41	1 5.90	22 12 3.77
	24	22 29 26.16	9.484	9 28 48.9	55.40	13 23.63	0.371	16 11.19	1 5.81	22 16 0.32
	25	22 33 13.47	9.459	9 6 34.9	55.75	13 14.41	0.396	16 10.96	1 5.73	22 19 56.88
	26	22 37 0.17	9.434	− 8 44 13.0	+56.08	+13 4.60	−0.421	16 10.73	1 5.64	22 23 53.43
	27	22 40 46.30	9.410	8 21 43.4	56.38	12 54.20	0.445	16 10.50	1 5.56	22 27 49.98
	28	22 44 31.86	9.387	7 59 6.6	56.67	12 43.24	0.468	16 10.27	1 5.49	22 31 46.54
lar.	1	22 48 16.89	9.365	7 36 23.0	56.95	12 31.73	0.490	16 10.04	1 5.41	22 35 43.09
	2	22 52 1.38	9.344	7 13 32.9	57.21	12 19.70	0.511	16 9.80	1 5.34	22 39 39.65
	3	22 55 45.36	9.323	− 6 50 36.7	+57.46	+12 7.17	−0.532	16 9.56	1 5.27	22 43 36.20
	4	22 59 28.86	9.303	6 27 35.0	57.68	11 54.14	0.552	16 9.32	1 5.21	22 47 32.75
	5	23 3 11.87	9.283	6 4 28.0	57.89	11 40.66	0.571	16 9.08	1 5.14	22 51 29.31
	6	23 6 54.46	9.265	5 41 16.0	58.09	11 26.72	0.590	16 8.83	1 5.08	22 55 25.86
	7	23 10 36.62	9.248	5 17 59.4	58.28	11 12.36	0.606	16 8.58	1 5.02	22 59 22.41
	8	23 14 18.38	9.232	− 4 54 38.6	+58.44	+10 57.61	−0.622	16 8.32	1 4.96	23 3 18.97
	9	23 17 59.76	9.217	4 31 14.0	58.59	10 42.48	0.638	16 8.06	1 4.91	23 7 15.52
	10	23 21 40.79	9.202	4 7 46.0	58.74	10 27.00	0.652	16 7.80	1 4.85	23 11 12.07
	11	23 25 21.48	9.189	3 44 14.8	58.85	10 11.18	0.666	16 7.53	1 4.81	23 15 8.63
	12	23 29 1.85	9.177	3 20 40.8	58.96	9 55.06	0.678	16 7.27	1 4.76	23 19 5.18
	13	23 32 41.96	9.166	− 2 57 4.5	+59.06	+ 9 38.64	−0.689	16 7.00	1 4.72	23 23 1.73
	14	23 36 21.79	9.155	2 33 26.1	59.13	9 21.97	0.700	16 6.73	1 4.68	23 26 58.28
	15	23 40 1.38	9.145	2 9 45.9	59.20	9 5.05	0.709	16 6.46	1 4.64	23 30 54.84
	16	23 43 40.75	9.136	1 46 4.5	59.25	8 47.91	0.718	16 6.18	1 4.60	23 34 51.39
	17	23 47 19.93	9.129	1 22 22.2	59.27	8 30.59	0.725	16 5.91	1 4.57	23 38 47.94
	18	23 50 58.94	9.122	− 0 58 39.2	+59.29	+ 8 13.09	−0.732	16 5.63	1 4.55	23 42 44.50
	19	23 54 37.77	9.116	0 34 56.0	59.30	7 55.43	0.738	16 5.36	1 4.53	23 46 41.05
	20	23 58 16.48	9.110	− 0 11 13.0	59.27	7 37.63	0.744	16 5.08	1 4.51	23 50 37.60
	21	0 1 55.07	9.105	+ 0 12 29.3	59.24	7 19.72	0.749	16 4.80	1 4.49	23 54 34.16
	22	0 5 33.55	9.101	0 36 10.7	59.20	7 1.68	0.753	16 4.53	1 4.47	23 58 30.71
	23	0 9 11.94	9.098	+ 0 59 50.7	+59.13	+ 6 43.56	−0.756	16 4.25	1 4.46	0 2 27.26
	24	0 12 50.25	9.096	1 23 29.0	59.06	6 25.38	0.759	16 3.98	1 4.45	0 6 23.81
	25	0 16 28.51	9.094	1 47 5.1	58.95	6 7.14	0.761	16 3.71	1 4.44	0 10 20.37
	26	0 20 6.72	9.092	2 10 38.8	58.84	5 48.84	0.762	16 3.43	1 4.44	0 14 16.92
	27	0 23 44.91	9.091	2 34 9.5	58.71	5 30.53	0.763	16 3.16	1 4.44	0 18 13.47
	28	0 27 23.10	9.091	+ 2 57 37.0	+58.57	+ 5 12.22	−0.763	16 2.89	1 4.44	0 22 10.03
	29	0 31 1.29	9.092	3 21 0.9	58.41	4 53.91	0.762	16 2.62	1 4.44	0 26 6.58
	30	0 34 39.52	9.094	3 44 20.7	58.24	4 35.63	0.760	16 2.35	1 4.45	0 30 3.13
	31	0 38 17.80	9.097	4 7 36.4	58.06	4 17.41	0.757	16 2.08	1 4.46	0 33 59.69
pr.	1	0 41 56.15	9.100	4 30 47.4	57.86	3 59.26	0.754	16 1.81	1 4.48	0 37 56.24
	2	0 45 34.60	9.104	+ 4 53 53.4	+57.64	+ 3 41.20	−0.750	16 1.54	1 4.49	0 41 52.79
	3	0 49 13.16	9.109	+ 5 16 54.1	+57.41	+ 3 23.25	−0.745	16 1.26	1 4.52	0 45 49.34

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

FOR WASHINGTON APPARENT NOON.																				
Date.		Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.		S. T. of Sem. Pass Merid.		Sidereal Time of Mean Noon.				
		h	m	s	s	°	'	"	"	m	s	s	'	"	m	s	h	m	s	
Apr.	1	0	41	56.15	9.100	+	4	30	47.4	+57.86	+3	59.26	-0.754	16	1.81	1	4.48	0	37	56.24
	2	0	45	34.60	9.104		4	53	53.4	57.64	3	41.20	0.750	16	1.54	1	4.49	0	41	52.79
	3	0	49	13.16	9.109		5	16	54.1	57.41	3	23.25	0.745	16	1.26	1	4.52	0	45	49.34
	4	0	52	51.85	9.115		5	39	49.3	57.17	3	5.44	0.739	16	0.99	1	4.54	0	49	45.90
	5	0	56	30.68	9.122		6	2	38.4	56.91	2	47.77	0.732	16	0.72	1	4.57	0	53	42.45
	6	1	0	9.70	9.130	+	6	25	21.3	+56.65	+2	30.29	-0.724	16	0.44	1	4.60	0	57	39.00
	7	1	3	48.91	9.139		6	47	57.6	56.37	2	12.99	0.716	16	0.17	1	4.63	1	1	35.56
	8	1	7	28.35	9.148		7	10	27.0	56.07	1	55.92	0.707	15	59.90	1	4.66	1	5	32.11
	9	1	11	8.03	9.158		7	32	49.2	55.76	1	39.09	0.696	15	59.62	1	4.70	1	9	28.66
	10	1	14	47.95	9.170		7	55	3.7	55.44	1	22.51	0.684	15	59.34	1	4.74	1	13	25.22
	11	1	18	28.16	9.182	+	8	17	10.5	+55.11	+1	6.22	-0.672	15	59.07	1	4.78	1	17	21.77
	12	1	22	8.69	9.195		8	39	9.0	54.76	0	50.22	0.659	15	58.79	1	4.82	1	21	18.33
	13	1	25	49.52	9.208		9	0	59.1	54.40	0	34.55	0.646	15	58.51	1	4.87	1	25	14.88
	14	1	29	30.70	9.228		9	22	40.2	54.02	0	19.22	0.632	15	58.24	1	4.91	1	29	11.43
	15	1	33	12.24	9.238		9	44	12.2	53.68	+0	4.23	0.617	15	57.96	1	4.96	1	33	7.99
	16	1	36	54.14	9.254	+10	5	34.6	+53.28	-0	10.37	-0.601	15	57.69	1	5.01	1	37	4.54	
	17	1	40	36.43	9.271		10	26	47.1	52.81	0	24.60	0.584	15	57.42	1	5.07	1	41	1.10
	18	1	44	19.13	9.288		10	47	49.4	52.37	0	38.42	0.567	15	57.15	1	5.13	1	44	57.65
	19	1	48	2.23	9.305		11	8	41.0	51.92	0	51.84	0.550	15	56.89	1	5.18	1	48	54.20
	20	1	51	45.74	9.322		11	29	21.6	51.46	1	4.83	0.532	15	56.63	1	5.24	1	52	50.76
	21	1	55	29.69	9.340	+11	49	51.0	+50.98	-1	17.41	-0.515	15	56.37	1	5.31	1	56	47.31	
	22	1	59	14.07	9.359		12	10	8.7	50.48	1	29.54	0.496	15	56.11	1	5.37	2	0	43.87
	23	2	2	58.91	9.378		12	30	14.3	49.98	1	41.24	0.478	15	55.86	1	5.44	2	4	40.42
	24	2	6	44.20	9.397		12	50	7.6	49.45	1	52.47	0.459	15	55.61	1	5.51	2	8	36.96
	25	2	10	29.95	9.416		13	9	48.1	48.91	2	3.25	0.440	15	55.36	1	5.58	2	12	33.53
	26	2	14	16.16	9.435	+13	29	15.6	+48.37	-2	13.56	-0.420	15	55.12	1	5.65	2	16	30.09	
	27	2	18	2.86	9.455		13	48	29.7	47.80	2	23.39	0.400	15	54.88	1	5.72	2	20	26.64
	28	2	21	50.04	9.476		14	7	30.2	47.22	2	32.73	0.379	15	54.64	1	5.80	2	24	23.19
	29	2	25	37.73	9.497		14	26	16.5	46.63	2	41.58	0.359	15	54.40	1	5.88	2	28	19.75
	30	2	29	25.92	9.518		14	44	48.6	46.03	2	49.93	0.337	15	54.16	1	5.95	2	32	16.30
May	1	2	33	14.62	9.540	+15	3	6.1	+45.42	-2	57.75	-0.315	15	53.93	1	6.03	2	36	12.86	
	2	2	37	3.84	9.562		15	21	8.6	44.79	3	5.06	0.293	15	53.70	1	6.11	2	40	9.41
	3	2	40	53.60	9.585		15	38	56.0	44.15	3	11.84	0.271	15	53.46	1	6.19	2	44	5.97
	4	2	44	43.89	9.607		15	56	27.8	43.50	3	18.09	0.249	15	53.24	1	6.27	2	48	2.53
	5	2	48	34.73	9.630		16	13	43.7	42.83	3	23.79	0.226	15	53.01	1	6.35	2	51	59.08
	6	2	52	26.13	9.653	+16	30	43.6	+42.15	-3	28.93	-0.208	15	52.78	1	6.43	2	55	55.64	
	7	2	56	18.10	9.677		16	47	27.0	41.46	3	33.51	0.179	15	52.56	1	6.51	2	59	52.19
	8	3	0	10.63	9.701		17	3	53.8	40.76	3	37.53	0.155	15	52.34	1	6.59	3	3	48.75
	9	3	4	3.73	9.725		17	20	3.5	40.05	3	40.96	0.131	15	52.11	1	6.68	3	7	45.30
	10	3	7	57.43	9.749		17	35	56.0	39.32	3	43.82	0.107	15	51.90	1	6.76	3	11	41.86
	11	3	11	51.72	9.774	+17	51	30.9	+38.58	-3	46.08	-0.082	15	51.68	1	6.84	3	15	38.41	
	12	3	15	46.59	9.799		18	6	48.0	37.83	3	47.75	0.057	15	51.47	1	6.92	3	19	34.97
	13	3	19	42.07	9.824		18	21	46.9	37.07	3	48.83	0.033	15	51.26	1	7.00	3	23	31.53
	14	3	23	38.14	9.848		18	36	27.3	36.29	3	49.31	-0.008	15	51.05	1	7.08	3	27	28.08
	15	3	27	34.80	9.873		18	50	49.1	35.51	3	49.20	+0.017	15	50.84	1	7.16	3	31	24.64
	16	3	31	32.07	9.898	+19	4	51.7	+34.71	-3	48.50	+0.041	15	50.64	1	7.24	3	35	21.20	
	17	3	35	29.92	9.922	+19	18	35.1	+33.89	-3	47.22	+0.065	15	50.44	1	7.32	3	39	17.75	

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.13 from the sidereal interval.



FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi-diameter.		S. T. of Sem. Pass. Merid.		Sidereal Time of Mean Noon.		
	h	m	s		°	'	"		m	s		'	"	m	s	h	m	s
July 17	3	35	29.92	9.922	+19	18	35.1	+33.89	−3	47.22	+0.065	15	50.44	1	7.32	3	39	17.75
18	3	39	28.34	9.946	19	31	58.8	33.07	3	45.35	0.089	15	50.24	1	7.40	3	43	14.31
19	3	43	27.33	9.970	19	45	2.7	32.24	3	42.92	0.113	15	50.05	1	7.48	3	47	10.86
20	3	47	26.87	9.992	19	57	46.4	31.40	3	39.95	0.136	15	49.86	1	7.56	3	51	7.42
21	3	51	26.97	10.015	20	10	9.7	30.54	3	36.41	0.159	15	49.68	1	7.63	3	55	3.98
22	3	55	27.61	10.037	+20	22	12.3	+29.67	−3	32.35	+0.180	15	49.51	1	7.71	3	59	0.54
23	3	59	28.76	10.058	20	33	53.8	28.79	3	27.76	0.201	15	49.34	1	7.78	4	2	57.09
24	4	3	30.43	10.079	20	45	14.2	27.91	3	22.66	0.222	15	49.17	1	7.85	4	6	53.65
25	4	7	32.60	10.100	20	56	13.2	27.01	3	17.06	0.243	15	49.01	1	7.92	4	10	50.21
26	4	11	35.25	10.120	21	6	50.6	26.10	3	10.99	0.263	15	48.85	1	7.99	4	14	46.76
27	4	15	38.37	10.139	+21	17	6.1	+25.18	−3	4.44	+0.282	15	48.70	1	8.06	4	18	43.32
28	4	19	41.95	10.159	21	26	59.6	24.26	2	57.43	0.301	15	48.55	1	8.13	4	22	39.88
29	4	23	45.90	10.177	21	36	30.7	23.38	2	49.99	0.319	15	48.40	1	8.19	4	26	36.43
30	4	27	50.45	10.195	21	45	39.3	22.39	2	42.11	0.337	15	48.26	1	8.25	4	30	32.99
31	4	31	55.32	10.211	21	54	25.4	21.44	2	33.81	0.354	15	48.12	1	8.31	4	34	29.55
Aug 1	4	36	0.50	10.227	+22	2	48.6	+20.48	−2	25.12	+0.370	15	47.98	1	8.37	4	38	26.11
2	4	40	6.25	10.243	22	10	48.8	19.52	2	16.04	0.386	15	47.85	1	8.43	4	42	22.66
3	4	44	12.29	10.259	22	18	25.8	18.55	2	6.58	0.401	15	47.72	1	8.48	4	46	19.22
4	4	48	18.09	10.274	22	25	39.4	17.58	1	56.77	0.416	15	47.59	1	8.53	4	50	15.78
5	4	52	25.43	10.288	22	32	29.5	16.60	1	46.62	0.430	15	47.47	1	8.58	4	54	12.34
6	4	56	32.51	10.302	+22	38	56.0	+15.61	−1	36.12	+0.444	15	47.35	1	8.63	4	58	8.89
7	5	0	39.90	10.315	22	44	58.8	14.62	1	25.31	0.457	15	47.23	1	8.67	5	2	5.45
8	5	4	47.62	10.327	22	50	37.7	13.62	1	14.19	0.470	15	47.12	1	8.71	5	6	2.01
9	5	8	55.61	10.338	22	55	52.6	12.61	1	2.78	0.481	15	47.01	1	8.75	5	9	58.57
10	5	12	3.87	10.349	23	0	43.2	11.60	0	51.11	0.492	15	46.90	1	8.78	5	13	55.13
11	5	17	12.40	10.360	+23	5	9.6	+10.59	−0	39.17	+0.502	15	46.79	1	8.81	5	17	51.68
12	5	21	21.15	10.369	23	9	11.5	9.57	0	27.02	0.511	15	46.68	1	8.83	5	21	48.24
13	5	25	30.11	10.377	23	12	49.1	8.55	0	14.64	0.519	15	46.59	1	8.86	5	25	44.80
14	5	29	39.26	10.384	23	16	2.1	7.53	−0	2.09	0.526	15	46.49	1	8.88	5	29	41.36
15	5	33	48.58	10.391	23	18	50.4	6.50	+0	10.62	0.532	15	46.40	1	8.90	5	33	37.92
16	5	37	58.02	10.396	+23	21	14.0	+5.47	+0	23.48	+0.538	15	46.32	1	8.91	5	37	34.47
17	5	42	7.58	10.400	23	23	12.9	4.44	0	36.45	0.542	15	46.25	1	8.92	5	41	31.03
18	5	46	17.21	10.402	23	24	46.9	3.40	0	49.50	0.544	15	46.18	1	8.93	5	45	27.59
19	5	50	26.90	10.404	23	25	56.2	2.37	1	2.59	0.546	15	46.11	1	8.94	5	49	24.15
20	5	54	36.63	10.405	23	26	40.6	1.33	1	15.71	0.547	15	46.05	1	8.94	5	53	20.71
21	5	58	46.34	10.404	+23	27	0.2	+0.30	+1	28.84	+0.546	15	4.99	1	8.94	5	57	17.26
22	6	2	56.03	10.402	23	26	55.0	−0.73	1	41.93	0.544	15	45.94	1	8.94	6	1	13.82
23	6	7	5.65	10.399	23	26	25.0	1.77	1	54.97	0.541	15	45.90	1	8.93	6	5	10.38
24	6	11	15.20	10.395	23	25	30.2	2.80	2	7.91	0.537	15	45.86	1	8.92	6	9	6.94
25	6	15	24.63	10.390	23	24	10.7	3.83	2	20.74	0.532	15	45.82	1	8.91	6	13	3.50
26	6	19	33.93	10.385	+23	22	26.4	−4.86	+2	33.46	+0.527	15	45.79	1	8.89	6	17	0.05
27	6	23	43.08	10.377	23	20	17.6	5.88	2	46.01	0.519	15	45.77	1	8.87	6	20	56.61
28	6	27	52.04	10.369	23	17	44.1	6.90	2	58.38	0.511	15	45.75	1	8.85	6	24	53.17
29	6	32	0.80	10.360	23	14	46.3	7.92	3	10.56	0.502	15	45.73	1	8.81	6	28	49.73
30	6	36	9.33	10.350	23	11	23.9	8.94	3	22.50	0.493	15	45.72	1	8.78	6	32	46.28
Sept 1	6	40	17.62	10.340	+23	7	37.2	−9.95	+3	34.19	+0.482	15	45.71	1	8.75	6	36	42.84
2	6	44	25.64	10.328	+23	3	26.5	−10.95	+3	45.63	+0.470	15	45.71	1	8.71	6	40	39.40

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.



FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Semi-Pass Merid.	Sidereal Time of Mean Noon.
		h m s	s	° ' "	"	m s	s	' "	m s	h m s
July	1	6 40 17.62	10.340	+23 7 37.2	− 9.95	+3 34.19	+0.482	15 45.71	1 8.75	6 36 42.84
	2	6 44 25.64	10.328	23 3 26.5	10.95	3 45.63	0.470	15 45.71	1 8.71	6 40 39.40
	3	6 48 33.38	10.316	22 58 51.5	11.95	3 56.76	0.458	15 45.70	1 8.67	6 44 35.96
	4	6 52 40.80	10.303	22 53 52.5	12.95	4 7.61	0.445	15 45.70	1 8.63	6 48 32.52
	5	6 56 47.93	10.290	22 48 29.6	13.95	4 18.15	0.432	15 45.71	1 8.59	6 52 29.07
	6	7 0 54.71	10.276	+22 42 42.9	−14.93	+4 28.34	+0.418	15 45.71	1 8.54	6 56 25.63
	7	7 5 1.15	10.261	22 36 32.7	15.92	4 38.20	0.403	15 45.72	1 8.49	7 0 22.19
	8	7 9 7.24	10.246	22 29 58.7	16.90	4 47.70	0.389	15 45.74	1 8.44	7 4 18.75
	9	7 13 12.96	10.230	22 23 1.5	17.87	4 56.84	0.372	15 45.75	1 8.38	7 8 15.30
	10	7 17 18.28	10.213	22 15 41.0	18.84	5 5.58	0.355	15 45.78	1 8.32	7 12 11.86
	11	7 21 23.21	10.196	+22 7 57.3	−19.79	+5 13.92	+0.338	15 45.81	1 8.26	7 16 8.42
	12	7 25 27.70	10.178	21 59 50.9	20.74	5 21.85	0.321	15 45.84	1 8.20	7 20 4.97
	13	7 29 31.76	10.160	21 51 21.6	21.69	5 29.32	0.302	15 45.87	1 8.14	7 24 1.53
	14	7 33 35.37	10.141	21 42 29.9	22.62	5 36.35	0.283	15 45.91	1 8.07	7 27 58.09
	15	7 37 38.51	10.121	21 33 15.9	23.55	5 42.93	0.264	15 45.95	1 8.00	7 31 54.65
	16	7 41 41.16	10.100	+21 23 39.8	−24.46	+5 49.00	+0.243	15 46.00	1 7.92	7 35 51.21
	17	7 45 43.30	10.078	21 13 41.8	25.36	5 54.57	0.221	15 46.05	1 7.85	7 39 47.76
	18	7 49 44.92	10.056	21 3 22.1	26.26	5 59.62	0.199	15 46.12	1 7.77	7 43 44.32
	19	7 53 46.01	10.034	20 52 41.2	27.15	6 4.14	0.177	15 46.18	1 7.70	7 47 40.88
	20	7 57 46.53	10.011	20 41 39.1	28.02	6 8.10	0.154	15 46.26	1 7.62	7 51 37.43
	21	8 1 46.51	9.987	+20 30 16.1	−28.88	+6 11.51	+0.130	15 46.34	1 7.54	7 55 33.99
	22	8 5 45.92	9.963	20 18 32.5	29.74	6 14.35	0.106	15 46.42	1 7.46	7 59 30.55
	23	8 9 44.73	9.939	20 6 28.4	30.59	6 16.60	0.082	15 46.51	1 7.38	8 3 27.10
	24	8 13 42.96	9.914	19 54 4.3	31.42	6 18.26	0.057	15 46.60	1 7.29	8 7 23.66
	25	8 17 40.59	9.888	19 41 20.4	32.23	6 19.32	0.032	15 46.70	1 7.21	8 11 20.22
	26	8 21 37.60	9.862	+19 28 16.9	−33.04	+6 19.79	+0.006	15 46.80	1 7.13	8 15 16.77
	27	8 25 34.00	9.837	19 14 54.2	33.84	6 19.63	−0.020	15 46.90	1 7.04	8 19 13.33
	28	8 29 29.78	9.811	19 1 12.4	34.63	6 18.86	0.045	15 47.02	1 6.96	8 23 9.89
	29	8 33 24.95	9.785	18 47 11.9	35.40	6 17.47	0.071	15 47.13	1 6.87	8 27 6.44
	30	8 37 19.48	9.759	18 32 53.0	36.16	6 15.46	0.097	15 47.25	1 6.79	8 31 3.00
	31	8 41 13.40	9.733	+18 18 15.9	−36.92	+6 12.82	−0.123	15 47.37	1 6.70	8 34 59.56
Aug.	1	8 45 6.70	9.708	18 3 20.8	37.66	6 9.57	0.148	15 47.50	1 6.61	8 38 56.11
	2	8 48 59.38	9.683	17 48 8.1	38.39	6 5.71	0.173	15 47.62	1 6.53	8 42 52.67
	3	8 52 51.46	9.658	17 32 38.0	39.11	6 1.24	0.198	15 47.75	1 6.44	8 46 49.22
	4	8 56 42.93	9.633	17 16 50.8	39.82	5 56.17	0.223	15 47.88	1 6.35	8 50 45.78
	5	9 0 33.80	9.608	+17 0 46.9	−40.51	+5 50.51	−0.248	15 48.02	1 6.27	8 54 42.34
	6	9 4 24.10	9.584	16 44 26.2	41.20	5 44.26	0.272	15 48.15	1 6.18	8 58 38.89
	7	9 8 13.80	9.559	16 27 49.2	41.87	5 37.44	0.296	15 48.29	1 6.09	9 2 35.45
	8	9 12 2.94	9.536	16 10 56.2	42.54	5 30.04	0.320	15 48.44	1 6.01	9 6 32.00
	9	9 15 51.51	9.512	15 53 47.5	43.18	5 22.08	0.343	15 48.58	1 5.92	9 10 28.56
	10	9 19 39.63	9.489	+15 36 23.4	−43.81	+5 13.56	−0.367	15 48.73	1 5.84	9 14 25.11
	11	9 23 26.98	9.466	15 18 44.2	44.44	5 4.48	0.390	15 48.88	1 5.76	9 18 21.67
	12	9 27 13.89	9.443	15 0 50.2	45.05	4 54.85	0.413	15 49.04	1 5.67	9 22 18.22
	13	9 31 0.24	9.420	14 42 41.6	45.65	4 44.69	0.435	15 49.21	1 5.59	9 26 14.78
	14	9 34 46.06	9.398	14 24 19.0	46.23	4 33.98	0.457	15 49.38	1 5.51	9 30 11.33
	15	9 38 31.35	9.376	+14 5 42.6	−46.80	+4 22.74	−0.479	15 49.55	1 5.44	9 34 7.89
	16	9 42 16.10	9.354	+13 46 52.6	−47.36	+4 10.98	−0.501	15 49.72	1 5.36	9 38 4.44

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
		h m s	s	° ' "	"	m s	s	' "	m s	h m s
Aug.	16	9 42 16.10	9.354	+13 46 52.6	-47.36	+ 4 10.98	-0.501	15 49.72	1 5.36	9 38 4.44
	17	9 46 0.34	9.333	13 27 49.5	47.89	3 58.69	0.522	15 49.90	1 5.29	9 42 1.00
	18	9 49 44.07	9.312	13 8 33.7	48.42	3 45.90	0.543	15 50.09	1 5.21	9 45 57.55
	19	9 53 27.29	9.291	12 49 5.4	48.94	3 32.60	0.564	15 50.28	1 5.14	9 49 54.11
	20	9 57 10.02	9.271	12 29 24.8	49.43	3 18.82	0.584	15 50.47	1 5.07	9 53 50.66
	21	10 0 52.26	9.250	+12 9 32.5	-49.91	+ 3 4.55	-0.604	15 50.67	1 5.00	9 57 47.22
	22	10 4 34.03	9.231	11 49 28.8	50.39	2 49.79	0.624	15 50.87	1 4.94	10 1 43.77
	23	10 8 15.32	9.211	11 29 13.8	50.85	2 34.58	0.643	15 51.08	1 4.87	10 5 40.32
	24	10 11 56.17	9.193	11 8 48.1	51.29	2 18.91	0.662	15 51.29	1 4.81	10 9 36.88
	25	10 15 36.58	9.175	10 48 11.9	51.72	2 2.81	0.680	15 51.50	1 4.74	10 13 33.43
Sept.	26	10 19 16.56	9.157	+10 27 25.6	-52.14	+ 1 46.27	-0.698	15 51.72	1 4.68	10 17 29.99
	27	10 22 56.12	9.140	10 6 29.4	52.54	1 29.34	0.714	15 51.94	1 4.63	10 21 26.54
	28	10 26 35.28	9.124	9 45 23.7	52.93	1 11.99	0.730	15 52.16	1 4.57	10 25 23.09
	29	10 30 14.06	9.109	9 24 8.7	53.31	0 54.27	0.746	15 52.39	1 4.52	10 29 19.65
	30	10 33 52.49	9.094	9 2 44.9	53.67	0 36.19	0.760	15 52.61	1 4.47	10 33 16.20
	31	10 37 30.57	9.080	+ 8 41 12.4	-54.02	+ 0 17.77	-0.774	15 52.84	1 4.42	10 37 12.76
	1	10 41 8.33	9.067	8 19 31.6	54.37	- 0 0.98	0.788	15 53.06	1 4.37	10 41 9.31
	2	10 44 45.79	9.055	7 57 42.8	54.70	0 20.02	0.799	15 53.29	1 4.33	10 45 5.86
	3	10 48 22.97	9.044	7 35 46.1	55.02	0 39.34	0.810	15 53.52	1 4.29	10 49 2.42
	4	10 51 59.90	9.034	7 13 41.9	55.32	0 58.91	0.820	15 53.75	1 4.25	10 52 58.97
	5	10 55 36.59	9.024	+ 6 51 30.6	-55.61	- 1 18.72	-0.830	15 53.99	1 4.22	10 56 55.52
	6	10 59 13.07	9.016	6 29 12.5	55.89	1 38.73	0.838	15 54.22	1 4.18	11 0 52.08
	7	11 2 49.37	9.009	6 6 47.8	56.16	1 58.94	0.845	15 54.46	1 4.15	11 4 48.63
	8	11 6 25.47	9.002	5 44 16.9	56.41	2 19.33	0.852	15 54.69	1 4.13	11 8 45.18
	9	11 10 1.42	8.995	5 21 40.2	56.65	2 39.88	0.859	15 54.93	1 4.10	11 12 41.73
	10	11 13 37.23	8.990	+ 4 58 58.0	-56.87	- 3 0.56	-0.864	15 55.18	1 4.08	11 16 38.29
	11	11 17 12.94	8.985	4 36 10.4	57.08	3 21.35	0.869	15 55.42	1 4.06	11 20 34.84
	12	11 20 48.53	8.981	4 13 18.0	57.28	3 42.26	0.873	15 55.67	1 4.05	11 24 31.39
	13	11 24 24.02	8.978	3 50 21.2	57.46	4 3.26	0.876	15 55.92	1 4.03	11 28 27.95
	14	11 27 59.46	8.976	3 27 20.2	57.62	4 24.32	0.878	15 56.18	1 4.02	11 32 24.50
	15	11 31 34.84	8.974	+ 3 4 15.5	-57.77	- 4 45.44	-0.880	15 56.43	1 4.01	11 36 21.05
	16	11 35 10.17	8.972	2 41 7.2	57.91	5 6.60	0.882	15 56.69	1 4.01	11 40 17.61
	17	11 38 45.50	8.972	2 17 55.9	58.02	5 27.77	0.882	15 56.96	1 4.01	11 44 14.16
	18	11 42 20.82	8.972	1 54 41.8	58.13	5 48.94	0.882	15 57.22	1 4.01	11 48 10.71
	19	11 45 56.15	8.973	1 31 25.3	58.23	6 10.11	0.881	15 57.49	1 4.01	11 52 7.26
	20	11 49 31.52	8.974	+ 1 8 6.8	-58.30	- 6 31.23	-0.880	15 57.76	1 4.02	11 56 3.82
	21	11 53 6.93	8.977	0 44 46.6	58.37	6 52.31	0.877	15 58.03	1 4.03	12 0 0.37
	22	11 56 42.42	8.981	+ 0 21 25.1	58.42	7 13.32	0.873	15 58.30	1 4.04	12 3 56.92
	23	12 0 18.00	8.985	- 0 1 57.3	58.45	7 34.24	0.869	15 58.58	1 4.06	12 7 53.48
	24	12 3 53.67	8.989	0 25 20.5	58.47	7 55.06	0.865	15 58.86	1 4.08	12 11 50.03
	25	12 7 29.48	8.995	- 0 48 44.0	-58.48	- 8 15.75	-0.859	15 59.13	1 4.11	12 15 46.58
	26	12 11 5.42	9.001	1 12 7.4	58.47	8 36.29	0.853	15 59.41	1 4.14	12 19 43.14
	27	12 14 41.54	9.009	1 35 30.4	58.44	8 56.68	0.845	15 59.69	1 4.17	12 23 39.69
	28	12 18 17.86	9.018	1 58 52.7	58.41	9 16.87	0.837	15 59.97	1 4.20	12 27 36.24
	29	12 21 54.38	9.027	2 22 14.0	58.36	9 36.84	0.827	16 0.24	1 4.23	12 31 32.79
	30	12 25 31.14	9.037	- 2 45 34.0	-58.30	- 9 56.57	-0.817	16 0.52	1 4.27	12 35 29.35
Oct.	1	12 29 8.16	9.049	- 3 8 52.5	-58.22	-10 16.05	-0.805	16 0.80	1 4.31	12 39 25.90

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
Oct. 1	12 29 8.16	9.049	— 3 8 52.5	—58.22	—10 16.05	—0.805	16 0.80	1 4.31	12 39 25.90
2	12 32 45.49	9.062	3 32 9.0	58.14	10 35.22	0.792	16 1.07	1 4.35	12 43 22.45
3	12 36 23.12	9.075	3 55 23.1	58.08	10 54.09	0.779	16 1.35	1 4.40	12 47 19.00
4	12 40 1.10	9.089	4 18 34.6	57.91	11 12.62	0.765	16 1.62	1 4.45	12 51 15.56
5	12 43 39.43	9.105	4 41 43.2	57.78	11 30.79	0.749	16 1.89	1 4.50	12 55 12.11
6	12 47 18.16	9.122	— 5 4 48.3	—57.64	—11 48.56	—0.732	16 2.16	1 4.56	12 59 8.66
7	12 50 57.28	9.139	5 27 49.9	57.48	12 5.95	0.715	16 2.43	1 4.62	13 3 5.22
8	12 54 36.84	9.157	5 50 47.4	57.30	12 22.90	0.697	16 2.70	1 4.68	13 7 1.77
9	12 58 16.88	9.176	6 13 40.4	57.11	12 39.41	0.678	16 2.98	1 4.74	13 10 58.32
10	13 1 57.90	9.196	6 36 28.5	56.89	12 55.46	0.659	16 3.25	1 4.81	13 14 54.88
11	13 5 38.24	9.216	— 6 59 11.5	—56.67	—13 11.02	—0.639	16 3.52	1 4.88	13 18 51.43
12	13 9 19.68	9.238	7 21 49.0	56.43	13 26.10	0.617	16 3.79	1 4.95	13 22 47.98
13	13 13 1.63	9.260	7 44 20.3	56.17	13 40.65	0.595	16 4.06	1 5.03	13 26 44.54
14	13 16 44.12	9.282	8 6 45.2	55.90	13 54.69	0.573	16 4.34	1 5.11	13 30 41.09
15	13 20 27.16	9.305	8 29 3.5	55.61	14 8.17	0.550	16 4.61	1 5.19	13 34 37.64
16	13 24 10.75	9.328	— 8 51 14.5	—55.30	—14 21.08	—0.526	16 4.88	1 5.27	13 38 34.20
17	13 27 54.92	9.352	9 13 17.9	54.98	14 33.43	0.502	16 5.16	1 5.36	13 42 30.75
18	13 31 39.69	9.378	9 35 13.4	54.64	14 45.20	0.478	16 5.43	1 5.44	13 46 27.30
19	13 35 25.05	9.404	9 57 0.5	54.28	14 56.36	0.452	16 5.71	1 5.53	13 50 23.86
20	13 39 11.03	9.430	10 18 38.7	53.90	15 6.90	0.426	16 5.98	1 5.62	13 54 20.41
21	13 42 57.65	9.458	—10 40 7.8	—53.51	—15 16.81	—0.399	16 6.26	1 5.72	13 58 16.96
22	13 46 44.91	9.488	11 1 27.8	53.10	15 26.08	0.373	16 6.53	1 5.82	14 2 13.52
23	13 50 32.80	9.510	11 22 36.7	52.68	15 34.70	0.345	16 6.81	1 5.92	14 6 10.07
24	13 54 21.39	9.538	11 43 35.8	52.23	15 42.65	0.317	16 7.08	1 6.02	14 10 6.63
25	13 58 10.66	9.567	12 4 24.1	51.78	15 49.92	0.289	16 7.35	1 6.12	14 14 3.18
26	14 2 0.62	9.596	—12 25 1.3	—51.31	—15 56.50	—0.259	16 7.62	1 6.23	14 17 59.74
27	14 5 51.30	9.627	12 45 27.0	50.82	16 2.35	0.229	16 7.88	1 6.33	14 21 56.29
28	14 9 42.72	9.658	13 5 40.7	50.31	16 7.48	0.198	16 8.15	1 6.44	14 25 52.84
29	14 13 34.88	9.690	13 25 42.1	49.80	16 11.85	0.166	16 8.40	1 6.55	14 29 49.40
30	14 17 27.81	9.722	13 45 30.9	49.26	16 15.47	0.134	16 8.66	1 6.66	14 33 45.95
31	14 21 21.52	9.755	—14 5 6.7	—48.71	—16 18.31	—0.102	16 8.91	1 6.77	14 37 42.51
Nov. 1	14 25 16.03	9.788	14 24 28.9	48.14	16 20.34	0.068	16 9.16	1 6.89	14 41 39.06
2	14 29 11.35	9.822	14 43 37.4	47.55	16 21.59	0.035	16 9.40	1 7.00	14 45 35.62
3	14 33 7.48	9.856	15 2 31.5	46.95	16 22.01	—0.001	16 9.64	1 7.12	14 49 32.17
4	14 37 4.45	9.891	15 21 11.1	46.34	16 21.59	+0.034	16 9.88	1 7.24	14 53 28.73
5	14 41 2.26	9.926	—15 39 35.7	—45.70	—16 20.34	+0.070	16 10.12	1 7.36	14 57 25.28
6	14 45 0.92	9.962	15 57 44.7	45.04	16 18.24	0.105	16 10.35	1 7.47	15 1 21.84
7	14 49 0.44	9.998	16 15 37.9	44.37	16 15.29	0.141	16 10.59	1 7.59	15 5 18.39
8	14 53 0.81	10.034	16 33 14.8	43.69	16 11.47	0.177	16 10.82	1 7.71	15 9 14.95
9	14 57 2.06	10.070	16 50 34.9	42.99	16 6.81	0.213	16 11.04	1 7.83	15 13 11.51
10	15 1 4.16	10.106	—17 7 37.9	—42.26	—16 1.27	+0.249	16 11.27	1 7.95	15 17 8.06
11	15 5 7.13	10.142	17 24 23.4	41.52	15 54.88	0.285	16 11.49	1 8.07	15 21 4.62
12	15 9 10.95	10.178	17 40 51.0	40.77	15 47.62	0.320	16 11.71	1 8.19	15 25 1.17
13	15 13 15.65	10.213	17 57 0.1	39.99	15 39.51	0.356	16 11.93	1 8.31	15 28 57.73
14	15 17 21.20	10.249	18 12 50.4	39.20	15 30.54	0.391	16 12.14	1 8.42	15 32 54.29
15	15 21 27.60	10.284	—18 28 21.6	—38.39	—15 20.72	+0.426	16 12.36	1 8.54	15 36 50.84
16	15 25 34.85	10.319	—18 43 33.3	—37.57	—15 10.06	+0.461	16 12.57	1 8.66	15 40 47.40

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

ate.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
16	15 25 34.85	10.319	—18 43 33.3	—37.57	—15 10.06	+0.461	16 12.57	1 8.66	15 40 47.40
17	15 29 42.91	10.353	18 58 24.9	36.73	14 58.57	0.496	16 12.78	1 8.78	15 44 43.95
18	15 33 51.83	10.388	19 12 56.1	35.87	14 46.25	0.530	16 12.99	1 8.89	15 48 40.51
19	15 38 1.56	10.422	19 27 6.6	35.00	14 33.12	0.564	16 13.20	1 9.00	15 52 37.07
20	15 42 12.08	10.455	19 40 56.0	34.11	14 19.19	0.597	16 13.40	1 9.12	15 56 33.62
21	15 46 23.40	10.488	—19 54 23.9	—33.21	—14 4.47	+0.630	16 13.60	1 9.23	16 0 30.18
22	15 50 35.51	10.521	20 7 29.9	32.29	13 48.96	0.662	16 13.80	1 9.34	16 4 26.74
23	15 54 48.39	10.553	20 20 13.7	31.36	13 32.68	0.694	16 14.00	1 9.45	16 8 23.29
24	15 59 2.03	10.585	20 32 35.1	30.41	13 15.65	0.726	16 14.18	1 9.56	16 12 19.85
25	16 3 16.42	10.615	20 44 33.5	29.45	12 57.86	0.757	16 14.37	1 9.66	16 16 16.41
26	16 7 31.56	10.646	—20 56 8.6	—28.48	—12 39.33	+0.787	16 14.55	1 9.76	16 20 12.97
27	16 11 47.42	10.676	21 7 20.3	27.49	12 20.07	0.817	16 14.73	1 9.86	16 24 9.52
28	16 16 4.00	10.705	21 18 8.3	26.49	12 0.09	0.847	16 14.89	1 9.96	16 28 6.08
29	16 20 21.30	10.735	21 28 32.1	25.48	11 39.41	0.876	16 15.05	1 10.06	16 32 2.64
30	16 24 39.28	10.763	21 38 31.4	24.46	11 18.05	0.904	16 15.21	1 10.15	16 35 59.19
1	16 28 57.95	10.791	—21 48 6.0	—23.42	—10 56.00	+0.932	16 15.37	1 10.24	16 39 55.75
2	16 33 17.27	10.819	21 57 15.5	22.37	10 33.31	0.959	16 15.52	1 10.33	16 43 52.31
3	16 37 37.23	10.845	22 5 59.7	21.31	10 9.97	0.985	16 15.66	1 10.41	16 47 48.87
4	16 41 57.82	10.870	22 14 18.3	20.24	9 46.01	1.010	16 15.80	1 10.49	16 51 45.43
5	16 46 18.99	10.894	22 22 11.1	19.16	9 21.46	1.035	16 15.93	1 10.57	16 55 41.98
6	16 50 40.75	10.918	—22 29 37.8	—18.06	— 8 56.33	+1.058	16 16.06	1 10.64	16 59 38.54
7	16 55 3.04	10.940	22 36 38.2	16.96	8 30.66	1.080	16 16.18	1 10.70	17 3 35.10
8	16 59 25.86	10.961	22 43 11.8	15.85	8 4.46	1.101	16 16.30	1 10.77	17 7 31.66
9	17 3 49.18	10.981	22 49 18.8	14.73	7 37.78	1.121	16 16.41	1 10.83	17 11 28.22
10	17 8 12.95	11.000	22 54 58.8	13.60	7 16.64	1.140	16 16.52	1 10.89	17 15 24.77
11	17 12 37.16	11.016	—23 0 11.5	—12.46	— 6 43.07	+1.157	16 16.63	1 10.95	17 19 21.33
12	17 17 1.75	11.032	23 4 56.9	11.31	6 15.10	1.178	16 16.73	1 11.00	17 23 17.89
13	17 21 26.72	11.047	23 9 14.8	10.16	5 46.78	1.187	16 16.84	1 11.04	17 27 14.45
14	17 25 52.00	11.060	23 13 5.0	9.01	5 18.12	1.200	16 16.93	1 11.06	17 31 11.01
15	17 30 17.58	11.071	23 16 27.3	7.85	4 49.18	1.211	16 17.03	1 11.12	17 35 7.56
16	17 34 43.42	11.081	—23 19 21.7	— 6.69	— 4 19.99	+1.221	16 17.12	1 11.16	17 39 4.12
17	17 39 9.46	11.088	23 21 48.2	5.52	3 50.59	1.228	16 17.20	1 11.18	17 43 0.68
18	17 43 35.68	11.095	23 23 46.6	4.35	3 21.00	1.235	16 17.29	1 11.20	17 46 57.24
19	17 48 2.03	11.100	23 25 16.7	3.17	2 51.29	1.240	16 17.36	1 11.22	17 50 53.80
20	17 52 28.49	11.104	23 26 18.7	2.00	2 21.47	1.244	16 17.43	1 11.24	17 54 50.36
21	17 56 55.03	11.106	—23 26 52.4	— 0.82	— 1 51.58	+1.246	16 17.50	1 11.25	17 58 46.91
22	18 1 21.58	11.106	23 26 57.9	+ 0.36	1 21.67	1.246	16 17.57	1 11.25	18 2 43.47
23	18 5 48.14	11.106	23 26 35.1	1.54	0 51.75	1.246	16 17.63	1 11.25	18 6 40.03
24	18 10 14.67	11.103	23 25 44.1	2.71	— 0 21.86	1.243	16 17.68	1 11.25	18 10 36.59
25	18 14 41.12	11.100	23 24 24.8	3.89	+ 0 7.96	1.240	16 17.73	1 11.24	18 14 33.15
26	18 19 7.49	11.096	—23 22 37.4	+ 5.06	+ 0 37.68	+1.236	16 17.77	1 11.23	18 18 29.71
27	18 23 33.73	11.090	23 20 21.8	6.24	1 7.28	1.230	16 17.81	1 11.21	18 22 26.26
28	18 27 59.82	11.083	23 17 38.0	7.41	1 36.73	1.228	16 17.83	1 11.19	18 26 22.82
29	18 32 25.72	11.075	23 14 26.2	8.57	2 6.00	1.215	16 17.85	1 11.16	18 30 19.38
30	18 36 51.41	11.066	23 10 46.4	9.74	2 35.05	1.206	16 17.87	1 11.13	18 34 15.94
31	18 41 16.86	11.055	—23 6 38.8	+10.90	+ 3 3.87	+1.195	16 17.88	1 11.09	18 38 12.50

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.12 from the sidereal interval.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Jan. 4, U Defective Illumination of N.  $0^{\circ}.83$ .  
Jan. 5, U Defective Illumination of S.  $0^{\circ}.02$ .

Jan. 6, U Defective Illumination of S.  $0^{\circ}.24$ .  
Jan. 7, U Defective Illumination of H.  $0^{\circ}.01$ .

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

**FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.**

1



FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Pr. 25	U	3 36.84	2.209	5 49 59.51	142.80	+24 46 18.6	-132.4	69.65	15 12.4	55 42.6	I. S.
25	L	16 3.04	2.156	6 18 14.11	139.56	24 10 4.4	228.7	68.85	15 7.1	55 23.4	
26	U	4 28.55	2.096	6 45 47.32	135.93	23 15 21.8	317.1	67.95	15 2.4	55 6.0	I. N.
26	L	16 53.32	2.033	7 12 35.84	132.14	22 3 49.0	397.0	66.99	14 58.3	54 50.9	
27	U	5 17.33	1.970	7 38 38.71	128.36	+20 37 8.4	-468.4	66.01	14 54.8	54 38.3	I. N.
27	L	17 40.60	1.910	8 3 57.12	124.75	18 57 1.1	531.4	65.06	14 52.1	54 28.2	
28	U	6 3.18	1.855	8 28 33.96	121.45	17 5 4.0	586.7	64.17	14 50.1	54 20.8	I. N.
28	L	18 25.15	1.807	8 52 33.54	118.56	15 2 48.2	634.7	63.38	14 48.8	54 16.1	
29	U	6 46.58	1.767	9 16 1.23	116.15	+12 51 38.4	-675.8	62.70	14 48.3	54 14.2	I. N.
29	L	19 7.58	1.736	9 39 3.15	114.27	10 32 53.6	710.6	62.16	14 48.5	54 15.1	
30	U	7 28.27	1.714	10 1 45.96	112.97	8 7 48.0	739.3	61.78	14 49.5	54 18.6	I. N.
30	L	19 48.75	1.702	10 24 16.77	112.27	5 37 33.2	762.2	61.56	14 51.1	54 24.7	
Lay 1	U	8 9.16	1.701	10 46 42.86	112.19	+ 3 3 18.9	-779.2	61.50	14 53.4	54 33.2	I. N.
1	L	20 29.62	1.710	11 9 11.82	112.74	+ 0 26 16.7	790.1	61.63	14 56.4	54 44.0	
2	U	8 50.25	1.730	11 31 51.32	113.95	- 2 12 18.4	794.6	61.94	14 59.9	54 56.8	I. N.
2	L	21 11.18	1.761	11 54 49.14	115.80	4 51 5.3	792.0	62.42	15 3.9	55 11.4	
3	U	9 32.55	1.802	12 18 13.08	118.30	- 7 28 35.2	-781.5	63.08	15 8.3	55 27.6	I. N.
3	L	21 54.48	1.854	12 42 10.81	121.43	10 3 8.8	762.5	63.90	15 13.0	55 44.9	
4	U	10 17.10	1.916	13 6 49.65	125.14	12 32 54.6	733.4	64.88	15 18.0	56 3.2	I. N.
4	L	22 40.51	1.987	13 32 16.35	129.39	14 55 47.9	693.5	65.98	15 23.1	56 22.0	
5	U	11 4.81	2.064	13 58 36.61	134.05	-17 9 30.7	-641.5	67.18	15 28.3	56 41.1	I. N. S.
5	L	23 30.06	2.146	14 25 54.58	138.98	19 11 33.2	576.6	68.44	15 33.5	57 0.1	
6	U	11 56.31	2.229	14 54 12.15	143.95	20 59 16.5	498.3	69.69	15 38.5	57 18.6	I. II. S.
7	L	0 23.54	2.308	15 23 28.39	148.71	22 29 59.4	406.6	70.88	15 43.3	57 36.3	
7	U	12 51.67	2.378	15 53 38.90	152.94	-23 41 5.6	-302.4	71.94	15 47.9	57 53.1	II. S.
8	L	1 20.56	2.435	16 24 35.60	156.35	24 30 15.1	187.6	72.79	15 52.1	58 8.5	
8	U	13 50.03	2.474	16 56 6.98	158.67	24 55 34.8	- 64.7	73.37	15 55.9	58 22.5	II. S.
9	L	2 19.84	2.491	17 27 58.74	159.73	24 55 49.5	+ 62.7	73.65	15 59.3	58 35.0	
9	U	14 49.73	2.487	17 59 55.31	159.47	-24 30 29.0	+190.5	73.63	16 2.3	58 45.8	II. N. S.
10	L	3 19.44	2.462	18 31 41.35	158.01	23 39 51.4	314.8	73.31	16 4.8	58 55.0	
10	U	15 48.76	2.421	19 3 3 3.39	155.52	22 25 0.9	432.1	72.73	16 6.8	59 2.5	II. N.
11	L	4 17.51	2.368	19 33 51.02	152.32	20 47 40.4	539.5	71.98	16 8.4	59 8.4	
11	U	16 45.57	2.308	20 3 57.58	148.73	-18 50 2.5	+634.7	71.12	16 9.6	59 12.8	II. N.
12	L	5 12.90	2.247	20 33 20.20	145.05	16 34 39.5	716.9	70.22	16 10.4	59 15.7	
12	U	17 39.51	2.189	21 1 59.50	141.55	14 4 13.7	785.2	69.34	16 10.8	59 17.2	II. N.
13	L	6 5.46	2.137	21 29 58.92	138.44	11 21 31.7	839.5	68.56	16 10.9	59 17.3	
13	U	18 30.83	2.094	21 57 24.04	135.86	- 8 29 19.2	+880.3	67.89	16 10.6	59 16.2	II. N.
14	L	6 55.76	2.062	22 24 21.96	133.91	5 30 18.6	907.7	67.37	16 9.9	59 13.8	
14	U	19 20.37	2.041	22 51 0.70	132.67	- 2 27 8.9	921.8	67.03	16 8.9	59 10.0	II. N.
15	L	7 44.80	2.032	23 17 28.71	132.12	+ 0 37 34.2	923.3	66.87	16 7.5	59 4.9	
15	U	20 9.19	2.035	23 43 54.47	132.29	+ 3 41 17.4	+911.8	66.88	16 5.7	58 58.5	II. N.
16	L	8 33.68	2.049	0 10 26.16	133.11	6 41 29.0	887.9	67.07	16 3.6	58 50.6	
16	U	20 58.39	2.072	0 37 11.32	134.51	9 35 37.6	851.4	67.41	16 1.1	58 41.3	II. N.
17	L	9 23.43	2.103	1 4 16.40	136.41	12 21 12.5	802.4	67.87	15 58.1	58 30.4	
17	U	21 48.89	2.141	1 31 46.45	138.65	+14 55 45.4	+741.1	68.41	15 54.8	58 18.2	II. N.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

*June 4, U Defective Illumination of N. 0'.38.*  
*June 5, U Defective Illumination of N. 0'.53.*

*June 6, U Defective Illumination of S. 0'.01.*

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
July 2	U	10 19.89	2.544	17 2 14.45	162.91	-24 56 16.2	- 33.3	74.43	16 8.5	59 8.5	I. N.S.
2	L	22 50.65	2.578	17 35 3.31	164.98	24 49 30.5	+101.8	74.90	16 15.0	59 32.3	
3	U	11 21.67	2.587	18 8 7.83	165.51	24 15 24.3	239.2	75.01	16 20.7	59 53.3	I. N.S.
3	L	23 52.64	2.571	18 41 9.50	164.53	23 14 0.0	373.9	74.77	16 25.5	60 11.0	
4	U	12 23.28	2.533	19 13 51.20	162.23	-21 46 21.6	+500.8	74.22	16 29.3	60 24.9	II. N.S.
5	L	0 53.35	2.478	19 45 58.96	158.93	19 54 28.9	615.6	73.43	16 31.9	60 34.6	
5	U	13 22.70	2.413	20 17 23.08	155.02	17 41 7.8	715.2	72.50	16 33.4	60 40.0	II. N.
6	L	1 51.24	2.344	20 47 58.48	150.87	15 9 34.4	797.4	71.51	16 33.7	60 41.0	
6	U	14 18.96	2.276	21 17 44.29	146.81	-12 23 22.3	+861.6	70.53	16 32.8	60 37.8	II. N.
7	L	2 45.90	2.214	21 46 43.23	143.09	9 26 9.4	907.6	69.62	16 30.8	60 30.6	
7	U	15 12.14	2.161	22 15 0.56	139.89	6 21 29.3	936.2	68.84	16 27.9	60 19.8	II. N.
8	L	3 37.81	2.119	22 42 43.39	137.35	3 12 44.9	948.5	68.22	16 24.2	60 6.0	
8	U	16 3.05	2.089	23 9 59.87	135.51	- 0 3 5.6	+945.6	67.77	16 19.7	59 49.6	II. N.
9	L	4 27.99	2.070	23 36 58.54	134.39	+ 3 4 34.2	928.8	67.50	16 14.7	59 31.2	
9	U	16 52.77	2.063	0 3 47.94	133.96	6 7 34.4	899.2	67.41	16 9.3	59 11.4	II. N.
10	L	5 17.54	2.067	0 30 36.17	134.18	9 3 27.5	857.8	67.47	16 3.6	58 50.6	
10	U	17 42.40	2.080	0 57 30.54	134.97	+11 49 58.0	+805.5	67.68	15 57.8	58 29.3	II. N.
11	L	6 7.47	2.100	1 24 37.26	136.22	14 24 59.4	743.1	68.01	15 52.0	58 7.9	
11	U	18 32.83	2.126	1 52 1.05	137.79	16 46 34.6	671.2	68.41	15 46.2	57 46.7	II. N.
12	L	6 58.52	2.155	2 19 44.94	139.54	18 52 55.5	590.8	68.83	15 40.5	57 25.9	
12	U	19 24.56	2.184	2 47 49.89	141.27	+20 42 24.5	+502.7	69.25	15 35.0	57 5.8	II. N.
13	L	7 50.93	2.210	3 16 14.58	142.80	22 13 35.8	408.1	69.61	15 29.8	56 46.5	
13	U	20 17.56	2.229	3 44 55.41	143.93	23 25 19.1	308.3	69.87	15 24.7	56 28.0	II. N.
14	L	8 44.37	2.238	4 13 46.64	144.50	24 16 42.8	205.2	69.98	15 20.0	56 10.5	
14	U	21 11.23	2.236	4 42 40.76	144.39	+24 47 17.5	+100.6	69.92	15 15.5	55 54.0	II. N.
15	L	9 37.99	2.222	5 11 29.11	143.54	24 56 58.0	- 3.5	69.68	15 11.3	55 38.5	
15	U	22 4.51	2.196	5 40 2.71	141.95	24 46 3.7	104.9	69.24	15 7.3	55 23.9	II. S.
16	L	10 30.64	2.158	6 8 12.97	139.67	24 15 18.4	201.7	68.64	15 3.6	55 10.4	
16	U	22 56.25	2.111	6 35 52.50	136.84	+23 25 46.8	-292.3	67.89	15 0.2	54 57.9	II. S.
17	L	11 21.27	2.057	7 2 55.63	133.62	22 18 50.4	375.7	67.05	14 57.1	54 46.4	
17	U	23 45.61	2.000	7 29 18.63	130.18	20 56 2.9	450.9	66.13	14 54.2	54 36.0	
18	L	12 9.26	1.942	7 54 59.87	126.69	19 19 4.8	517.4	65.21	14 51.7	54 26.7	
19	U	0 32.22	1.885	8 19 59.61	123.29	+17 29 39.9	-575.3	64.30	14 49.5	54 18.6	
19	L	12 54.53	1.833	8 44 19.82	120.12	15 29 30.5	624.9	63.45	14 47.6	54 11.8	
20	U	1 16.23	1.786	9 8 3.84	117.28	13 20 16.1	666.2	62.70	14 46.2	54 6.4	I. N.
20	L	13 37.41	1.745	9 31 16.15	114.85	11 3 31.2	700.1	62.04	14 45.1	54 2.5	
21	U	1 58.14	1.712	9 54 2.02	112.88	+ 8 40 45.0	-726.5	61.52	14 44.5	54 0.2	I. N.
21	L	14 18.54	1.688	10 16 27.40	111.43	6 13 20.3	746.4	61.14	14 44.3	53 59.6	
22	U	2 38.70	1.673	10 38 38.70	110.54	3 42 36.2	759.9	60.92	14 44.7	54 0.9	I. N.
22	L	14 58.74	1.668	11 0 42.73	110.23	+ 1 9 46.7	767.4	60.86	14 45.6	54 4.2	
23	U	3 18.78	1.673	11 22 46.58	110.52	- 1 23 55.4	-768.7	60.96	14 47.1	54 9.7	I. N.
23	L	15 38.94	1.688	11 44 57.58	111.43	3 57 19.3	764.2	61.25	14 49.2	54 17.4	
24	U	3 59.34	1.714	12 7 23.33	112.97	6 29 12.6	753.6	61.72	14 51.9	54 27.5	I. N.
24	L	16 20.11	1.750	12 30 11.50	115.17	8 58 19.2	736.4	62.36	14 55.3	54 40.0	
25	U	4 41.39	1.798	12 53 29.96	118.02	-11 23 17.3	-712.1	63.17	14 59.4	54 55.0	I. N.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

July 31, U Defective Illumination of *N.* 1".00.  
 Aug. 1, U Defective Illumination of *N.* 0".50.

Aug. 2, U Defective Illumination of *H.* 6".00.  
 Aug. 2, U Defective Illumination of *S.* 0".50.

**FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.**

Date:

Aug. 1

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Sept.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.
pt. 8	U
9	L
9	U
10	L
10	U
11	L
11	U
12	L
12	U
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26	U
26	L
27	U
27	L
28	U
28	L
29	U
29	L
30	U
Oct. 1	L
1	U

Sept. 20, U Defective Illumination of I. O. 20.



FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Oct. 1	U	12 55.39	2.207	1 36 56.62	148.65	+15 4 28.5	+700.8	70.81	16 24.9	60 8.9	II. N.
2	L	1 23.24	2.335	2 6 50.57	150.31	17 27 58.9	672.2	71.24	16 18.5	59 45.4	
2	U	13 51.40	2.358	2 37 3.14	151.71	19 32 37.3	572.6	71.61	16 11.4	59 19.3	II. N.
3	L	2 19.80	2.373	3 7 29.78	152.63	21 16 26.5	464.5	71.87	16 3.8	58 51.2	
3	U	14 48.31	2.377	3 38 3.62	152.89	+22 38 3.8	+350.9	71.97	15 55.8	58 21.9	II. N.
4	L	3 16.80	2.368	4 8 35.89	152.35	23 36 40.8	235.1	71.87	15 47.7	57 52.3	
4	U	15 45.10	2.345	4 38 56.67	150.97	24 12 9.2	120.0	71.56	15 39.7	57 22.9	II. N.
5	L	4 13.04	2.309	5 8 55.93	148.78	24 24 52.9	+ 8.2	71.04	15 31.9	56 54.4	
5	U	16 40.47	2.261	5 38 24.35	145.86	+24 15 46.5	- 98.1	70.34	15 24.5	56 27.3	II. N. S.
6	L	5 7.25	2.203	6 7 14.25	142.38	23 46 8.3	197.0	69.48	15 17.6	56 1.9	
6	U	17 33.30	2.139	6 35 19.95	138.53	22 57 32.9	287.5	68.52	15 11.3	55 38.7	II. S.
7	L	5 58.57	2.072	7 2 38.20	134.50	21 51 44.6	369.0	67.48	15 5.6	55 17.8	
7	U	18 23.03	2.005	7 29 7.95	130.46	+20 30 31.5	-441.6	66.43	15 0.6	54 59.4	II. S.
8	L	6 46.69	1.941	7 54 50.22	126.61	18 55 40.4	505.4	65.39	14 56.3	54 43.7	
8	U	19 9.62	1.881	8 19 47.74	123.03	17 8 53.7	500.9	64.41	14 52.7	54 30.5	II. S.
9	L	7 31.87	1.828	8 44 4.56	119.84	15 11 48.3	608.6	63.52	14 49.9	54 20.0	
9	U	19 53.52	1.782	9 7 45.69	117.10	+13 5 54.7	-649.0	62.74	14 47.7	54 12.1	II. S.
10	L	8 14.68	1.745	9 30 56.81	114.84	10 52 36.9	682.7	62.08	14 46.2	54 6.7	
10	U	20 35.44	1.716	9 53 44.08	113.12	8 33 14.4	710.0	61.57	14 45.4	54 3.6	II. S.
11	L	8 55.91	1.697	10 16 13.91	111.94	6 9 2.4	731.0	61.20	14 45.2	54 2.8	
11	U	21 16.20	1.686	10 38 32.89	111.31	+ 3 41 14.6	-746.0	60.98	14 45.5	54 4.0	II. S.
12	L	9 36.42	1.685	11 0 47.66	111.24	+ 1 11 3.5	754.8	60.93	14 46.4	54 7.2	
12	U	21 56.68	1.693	11 23 4.92	111.73	- 1 20 16.9	757.5	61.03	14 47.7	54 12.2	II. S.
13	L	10 17.09	1.710	11 45 31.25	112.76	3 51 30.2	753.7	61.30	14 49.5	54 18.7	
13	U	22 37.76	1.736	12 8 13.24	114.33	- 6 21 16.1	-742.8	61.71	14 51.7	54 26.7	II. S.
14	L	10 58.80	1.771	12 31 17.25	116.42	8 48 8.7	724.6	62.27	14 54.2	54 35.9	
14	U	23 20.30	1.814	12 54 49.35	119.01	11 10 35.9	698.4	62.97	14 57.0	54 46.2	
15	L	11 42.37	1.865	13 18 55.19	122.04	13 26 58.7	663.9	63.79	15 0.1	54 57.5	
16	U	0 5.08	1.921	13 43 39.76	125.45	-15 35 31.5	-620.1	64.71	15 3.4	55 9.7	
16	L	12 28.50	1.983	14 9 7.14	129.15	17 34 21.7	566.7	65.69	15 6.9	55 22.7	
17	U	0 52.68	2.047	14 35 20.09	133.02	19 21 32.0	503.4	66.72	15 10.6	55 36.3	I. N.
17	L	13 17.63	2.112	15 2 19.82	136.92	20 55 2.5	430.1	67.75	15 14.5	55 50.5	
18	U	1 43.35	2.174	15 30 5.47	140.65	-22 12 53.7	-346.9	68.74	15 18.6	56 5.3	I. N.
18	L	14 9.79	2.230	15 58 34.04	144.04	23 13 12.2	254.7	69.62	15 22.8	56 20.7	
19	U	2 36.84	2.278	16 27 40.20	146.89	23 54 16.1	154.7	70.36	15 27.1	56 36.7	I. N.
19	L	15 4.40	2.314	16 57 16.48	149.04	24 14 40.5	- 48.5	70.93	15 31.6	56 53.1	
20	U	3 32.31	2.336	17 27 13.76	150.37	-24 13 23.7	+ 61.8	71.30	15 36.2	57 10.1	I. N.
20	L	16 0.40	2.344	17 57 22.03	150.86	23 49 51.8	173.7	71.45	15 40.9	57 27.4	
21	U	4 28.50	2.338	18 27 31.19	150.53	23 3 58.7	284.7	71.39	15 45.8	57 45.2	I. S.
21	L	16 56.47	2.321	18 57 32.09	149.51	21 56 11.4	392.4	71.16	15 50.7	58 3.2	
22	U	5 24.18	2.295	19 27 17.31	147.95	-20 27 23.7	+494.4	70.79	15 55.6	58 21.3	I. S.
22	L	17 51.54	2.264	19 56 41.65	146.06	18 38 54.2	589.1	70.32	16 0.5	58 39.3	
23	U	6 18.50	2.230	20 25 42.40	144.05	16 32 22.9	674.6	69.82	16 5.3	58 57.0	I. S.
23	L	18 45.07	2.198	20 54 19.35	142.13	14 9 47.4	749.6	69.32	16 9.9	59 13.9	
24	U	7 11.28	2.171	21 22 34.56	140.46	-11 33 18.3	+813.2	68.88	16 14.3	59 29.8	I. S.

Oct. 5, U Defective Illumination of S. 0''.66.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

ate.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidiameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
24	U	7 11.28	2.171	21 22 34.56	140.46	-11 33 18.3	+813.2	68.88	16 14.3	59 29.8	I. S.
24	L	19 37.20	2.150	21 50 31.96	139.18	8 45 18.3	864.6	68.53	16 18.2	59 44.2	
25	U	8 2.91	2.137	22 18 16.95	138.41	5 48 19.9	902.8	68.30	16 21.6	59 56.7	I. S.
25	L	20 28.52	2.183	22 45 55.98	138.20	- 2 45 5.3	927.2	68.22	16 24.4	60 6.8	
26	U	8 54.14	2.140	23 13 36.08	138.59	+ 0 21 34.7	+936.9	68.29	16 26.4	60 14.1	I. S.
26	L	21 19.91	2.156	23 41 24.50	139.58	3 28 40.5	931.4	68.51	16 27.5	60 18.2	
27	U	9 45.93	2.182	0 9 28.21	141.13	6 33 6.1	910.1	68.87	16 27.6	60 18.8	I. S.
27	L	22 12.30	2.216	0 37 53.42	143.15	9 31 39.9	872.8	69.36	16 26.8	60 15.6	
28	U	10 39.12	2.255	1 6 45.14	145.51	+12 21 8.8	+819.3	69.93	16 24.9	60 8.6	I. N.S.
28	L	23 6.43	2.297	1 36 6.50	148.05	14 58 22.2	750.3	70.55	16 21.9	59 57.8	
29	U	11 34.25	2.338	2 5 58.31	150.55	17 20 18.8	666.8	71.16	16 18.0	59 43.3	I. II. N.
30	L	0 2.54	2.375	2 36 18.63	152.76	19 24 14.2	570.4	71.70	16 13.1	59 25.5	
30	U	12 31.22	2.403	3 7 2.39	154.42	+21 7 48.4	+463.8	72.12	16 7.5	59 4.9	II. N.
31	L	1 0.15	2.417	3 38 1.58	155.30	22 29 13.8	349.5	72.34	16 1.2	58 41.9	
31	U	13 29.17	2.416	4 9 5.76	155.23	23 27 21.2	281.3	72.35	15 54.5	58 17.1	II. N.
✓. 1	L	1 58.07	2.398	4 40 2.87	154.12	24 1 43.8	+112.7	72.11	15 47.4	57 51.2	
1	U	14 26.65	2.362	5 10 40.45	151.98	+24 12 36.8	- 3.1	71.63	15 40.2	57 24.8	II. N.
2	L	2 54.71	2.312	5 40 46.83	148.94	24 0 53.1	113.1	70.92	15 33.1	56 58.5	
2	U	15 22.09	2.249	6 10 12.28	145.20	23 27 56.5	214.9	70.02	15 26.1	56 32.9	II. N.S.
3	L	3 48.67	2.179	6 38 49.62	140.97	22 35 32.7	307.4	68.99	15 19.4	56 8.5	
3	U	16 14.37	2.105	7 6 34.65	136.52	+21 25 39.7	-389.7	67.88	15 13.2	55 45.7	II. S.
4	L	4 39.19	2.031	7 33 25.93	132.06	20 0 20.3	461.8	66.75	15 7.5	55 24.9	
4	U	17 3.13	1.960	7 59 24.52	127.77	18 21 35.1	524.1	65.64	15 2.5	55 6.3	II. S.
5	L	5 26.24	1.894	8 24 33.55	123.81	16 31 18.4	577.2	64.60	14 58.1	54 50.1	
5	U	17 48.61	1.836	8 48 57.69	120.29	+14 31 15.4	-621.9	63.65	14 54.4	54 36.6	II. S.
6	L	6 10.33	1.786	9 12 42.69	117.29	12 23 2.6	659.0	62.83	14 51.5	54 25.9	
6	U	18 31.51	1.745	9 35 55.06	114.86	10 8 7.0	689.1	62.15	14 49.3	54 17.9	II. S.
7	L	6 52.26	1.715	9 58 41.77	113.02	7 47 48.0	713.0	61.61	14 47.8	54 12.6	
7	U	19 12.71	1.694	10 21 10.06	111.80	+ 5 23 18.8	-730.9	61.25	14 47.2	54 10.2	II. S.
8	L	7 32.97	1.684	10 43 27.32	111.19	2 55 49.1	743.1	61.06	14 47.3	54 10.4	
8	U	19 53.17	1.684	11 5 40.97	111.20	+ 0 26 26.3	749.7	61.03	14 48.0	54 13.1	II. S.
9	L	8 13.43	1.695	11 27 58.46	111.82	- 2 3 41.3	750.6	61.17	14 49.4	54 18.2	
9	U	20 33.88	1.716	11 50 27.17	113.06	- 4 33 23.0	-745.3	61.48	14 51.4	54 25.5	II. S.
10	L	8 54.64	1.746	12 13 14.35	114.90	7 1 22.8	733.6	61.96	14 53.9	54 34.9	
10	U	21 15.82	1.786	12 36 27.09	117.32	9 26 18.4	714.5	62.60	14 57.0	54 46.1	II. S.
11	L	9 37.54	1.835	13 0 12.13	120.27	11 46 39.4	687.5	63.37	15 0.4	54 58.9	
11	U	21 59.90	1.892	13 24 35.64	123.72	-14 0 45.3	-651.9	64.27	15 4.3	55 12.9	II. S.
12	L	10 22.99	1.957	13 49 43.03	127.58	16 6 46.3	606.5	65.27	15 8.4	55 28.0	
12	U	22 46.88	2.026	14 15 38.50	131.72	18 2 43.0	551.0	66.34	15 12.7	55 43.9	
13	L	11 11.61	2.097	14 42 24.71	136.00	19 46 28.2	484.7	67.43	15 17.2	56 0.2	
13	U	23 37.19	2.167	15 10 2.14	140.22	-21 15 51.2	-407.4	68.50	15 21.7	56 16.8	
14	L	12 3.60	2.233	15 38 28.92	144.17	22 28 41.8	319.3	69.50	15 26.2	56 33.3	
15	U	0 30.74	2.290	16 7 40.32	147.62	23 22 57.7	221.7	70.36	15 30.6	56 49.7	
15	L	12 58.50	2.335	16 37 28.81	150.33	23 56 52.1	116.1	71.05	15 35.0	57 5.6	
16	U	1 26.71	2.365	17 7 44.55	152.13	-24 9 2.2	- 4.9	71.52	15 39.2	57 20.9	I. N.

Oct. 28, U Defective Illumination of N. 0' 35.  
Oct. 29, U Defective Illumination of II. 0' 04.

Nov. 2, U Defective Illumination of N. 0' 38.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Nov. 16	U	1 26.71	2.365	17 7 44.55	152.13	-24 9 2.2	- 4.9	71.52	15 39.2	57 20.9	I. N.
16	L	13 55.19	2.378	17 38 15.87	152.92	23 58 36.1	+109.4	71.74	15 43.2	57 35.6	
17	U	2 23.72	2.374	18 8 50.55	152.70	23 25 17.1	223.5	71.72	15 47.0	57 49.6	I. S.
17	L	14 52.11	2.355	18 39 16.86	151.55	22 29 25.1	334.5	71.47	15 50.6	58 2.7	
18	U	3 20.19	2.324	19 9 24.74	149.66	-21 11 55.1	+439.4	71.04	15 53.9	58 14.9	I. S.
18	L	15 47.84	2.284	19 39 6.60	147.26	19 34 11.8	536.3	70.48	15 57.0	58 26.4	
19	U	4 14.98	2.239	20 8 17.76	144.58	17 38 3.4	623.3	69.84	15 59.9	58 37.0	I. S.
19	L	16 41.58	2.194	20 36 56.51	141.89	15 25 34.8	699.5	69.19	16 2.5	58 46.7	
20	U	5 7.66	2.153	21 5 3.90	139.38	-12 59 1.9	+764.0	68.57	16 4.9	58 55.5	I. S.
20	L	17 33.28	2.118	21 32 43.35	137.25	10 20 46.7	816.5	68.04	16 7.1	59 3.5	
21	U	5 58.52	2.091	22 0 0.06	135.62	7 33 14.3	856.8	67.62	16 9.0	59 10.4	I. S.
21	L	18 23.49	2.073	22 27 0.63	134.59	4 38 52.0	884.9	67.35	16 10.6	59 16.2	
22	U	6 48.31	2.007	22 53 52.60	134.19	- 1 40 8.8	+900.3	67.23	16 11.8	59 20.8	I. S.
22	L	19 13.13	2.072	23 20 43.91	134.48	+ 1 20 24.9	903.1	67.29	16 12.7	59 24.1	
23	U	7 38.07	2.087	23 47 42.69	135.43	4 20 14.4	892.9	67.52	16 13.2	59 25.7	I. S.
23	L	20 3.26	2.113	0 14 56.79	137.01	7 16 41.7	869.3	67.89	16 13.1	59 25.5	
24	U	8 28.83	2.149	0 42 33.32	139.16	+10 7 4.9	+832.2	68.40	16 12.5	59 23.3	I. S.
24	L	20 54.87	2.192	1 10 38.25	141.74	12 48 38.6	781.1	69.02	16 11.3	59 19.0	
25	U	9 21.45	2.239	1 39 15.89	144.58	15 18 35.9	716.2	69.71	16 9.6	59 12.5	I. S.
25	L	21 48.61	2.287	2 8 28.27	147.48	17 34 13.2	637.9	70.40	16 7.1	59 3.6	
26	U	10 16.34	2.333	2 38 14.70	150.20	+19 32 55.0	+547.1	71.05	16 4.1	58 52.3	I. S.
26	L	22 44.57	2.370	3 8 31.38	152.48	21 12 22.0	445.7	71.59	16 0.4	58 38.8	
27	U	11 13.19	2.396	3 39 11.24	154.03	22 30 38.9	335.9	71.95	15 56.1	58 23.1	I. N.S.
27	L	23 42.02	2.407	4 10 4.34	154.66	23 26 22.9	220.7	72.09	15 51.3	58 5.5	
28	U	12 10.87	2.399	4 40 58.57	154.20	+23 58 49.5	+103.6	71.99	15 46.1	57 46.4	II. N.S.
29	L	0 39.53	2.373	5 11 40.78	152.65	24 7 55.8	- 12.0	71.62	15 40.6	57 26.0	
29	U	13 7.77	2.331	5 41 58.08	150.07	23 54 19.5	123.0	71.01	15 34.8	57 4.9	II. N.S.
30	L	1 35.40	2.274	6 11 39.09	146.64	23 19 13.3	226.5	70.18	15 28.9	56 43.4	
30	U	14 2.29	2.206	6 40 34.94	142.59	+22 24 18.5	-320.9	69.20	15 23.1	56 22.0	II. N.S.
Dec. 1	L	2 28.33	2.133	7 8 39.71	138.17	21 11 33.6	404.8	68.11	15 17.4	56 1.2	
1	U	14 53.47	2.057	7 35 50.49	133.63	19 43 6.7	477.9	66.98	15 12.0	55 41.3	II. S.
2	L	3 17.71	1.984	8 2 7.30	129.20	18 1 6.7	540.4	65.87	15 7.0	55 22.7	
2	U	15 41.09	1.915	8 27 32.43	126.05	+16 7 37.3	-592.8	64.80	15 2.4	55 5.8	II. S.
3	L	4 3.69	1.852	8 52 10.04	121.30	14 4 34.7	636.1	63.82	14 58.3	54 50.9	
3	U	16 25.58	1.798	9 16 5.65	118.06	11 53 43.9	671.1	62.96	14 54.8	54 38.2	II. S.
4	L	4 46.89	1.754	9 39 25.74	115.38	9 36 40.0	698.4	62.25	14 52.0	54 27.9	
4	U	17 7.72	1.720	10 2 17.34	113.32	+ 7 14 47.8	-719.1	61.69	14 49.9	54 20.2	II. S.
5	L	5 28.20	1.696	10 24 47.86	111.87	4 49 24.3	733.7	61.30	14 48.6	54 15.3	
5	U	17 48.46	1.683	10 47 4.97	111.08	+ 2 21 40.1	742.7	61.08	14 48.0	54 13.1	II. S.
6	L	6 8.62	1.680	11 9 16.49	110.95	- 0 7 18.2	746.1	61.04	14 48.2	54 13.8	
6	U	18 28.83	1.689	11 31 30.22	111.45	- 2 36 25.6	-744.1	61.17	14 49.1	54 17.2	II. S.
7	L	6 49.20	1.708	11 53 54.02	112.62	5 4 35.7	736.6	61.49	14 50.8	54 23.5	
7	U	19 9.86	1.738	12 16 35.72	114.44	7 30 39.2	723.0	61.97	14 53.2	54 32.4	II. S.
8	L	7 30.96	1.779	12 39 43.04	116.89	9 53 20.7	702.7	62.62	14 56.3	54 43.8	
8	U	19 52.60	1.830	13 3 23.41	119.94	-12 11 16.3	-675.2	63.44	15 0.1	54 57.5	II. S.

Nov. 27, U Defective Illumination of S. 0'.04.  
Nov. 28, U Defective Illumination of S. 0'.56.

Nov. 29, U Defective Illumination of S. 0'.05.  
Nov. 30, U Defective Illumination of N. 1'.39.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Dec. 8	U	19 52.60	1.830	13 3 23.41	119.94	-12 11 16.3	-675.2	63.44	15 0.1	54 57.5	II. S.
9	L	8 14.91	1.890	13 27 43.89	123.56	14 22 52.8	639.4	64.38	15 4.4	55 13.4	
9	U	20 37.99	1.958	13 52 50.81	127.67	16 26 24.9	594.3	65.44	15 9.2	55 31.1	II. S.
10	L	9 1.93	2.033	14 18 49.38	132.15	18 19 55.9	539.0	66.58	15 14.5	55 50.3	
10	U	21 26.79	2.111	14 45 43.24	136.85	-20 1 18.1	-472.8	67.76	15 20.0	56 10.7	II. S.
11	L	9 52.59	2.189	15 13 33.83	141.57	21 28 16.1	395.0	68.93	15 25.8	56 31.9	
11	U	22 19.31	2.264	15 42 19.89	146.05	22 38 30.9	305.6	70.02	15 31.6	56 53.3	II. S.
12	L	10 46.88	2.330	16 11 57.02	150.02	23 29 48.7	205.6	70.99	15 37.5	57 14.7	
12	U	23 15.17	2.383	16 42 17.49	153.23	-24 0 8.8	-96.4	71.75	15 43.1	57 35.5	
13	L	11 44.01	2.419	17 13 10.55	155.43	24 7 55.4	+19.5	72.28	15 48.5	57 55.3	
14	U	0 13.17	2.437	17 44 23.14	156.47	23 52 6.0	139.0	72.53	15 53.5	58 13.7	
14	L	12 42.42	2.435	18 15 41.18	156.34	23 12 19.7	258.4	72.51	15 58.1	58 30.3	
15	U	1 11.53	2.414	18 46 50.89	155.11	-22 9 0.0	+374.0	72.23	16 2.1	58 44.9	I. S.
15	L	13 40.30	2.379	19 17 40.25	152.99	20 43 13.2	482.4	71.74	16 5.5	58 57.4	
16	U	2 8.58	2.333	19 48 0.04	150.23	18 56 42.8	580.8	71.09	16 8.2	59 7.5	I. S.
16	L	14 36.27	2.282	20 17 44.34	147.12	16 51 41.8	667.2	70.35	16 10.3	59 15.2	
17	U	3 3.33	2.229	20 46 50.66	143.93	-14 30 42.3	+740.4	69.59	16 11.8	59 20.6	I. S.
17	L	15 29.77	2.179	21 15 19.70	140.94	11 56 27.9	799.6	68.88	16 12.7	59 23.8	
18	U	3 55.65	2.135	21 43 14.76	138.31	9 11 46.5	844.9	68.24	16 13.0	59 24.9	I. S.
18	L	16 21.05	2.100	22 10 41.18	136.20	6 19 25.0	876.4	67.72	16 12.8	59 24.2	
19	U	4 46.08	2.075	22 37 45.73	134.68	-3 22 6.2	+894.5	67.35	16 12.1	59 21.8	I. S.
19	L	17 10.88	2.061	23 4 36.12	133.83	-0 22 28.2	899.7	67.14	16 11.0	59 17.9	
20	U	5 35.58	2.058	23 31 20.50	133.68	+2 36 55.4	892.3	67.11	16 9.6	59 12.7	I. S.
20	L	18 0.32	2.067	23 58 7.11	134.21	5 33 35.7	872.5	67.25	16 7.9	59 6.4	
21	U	6 25.23	2.086	0 25 3.90	135.37	+8 25 6.3	+840.6	67.54	16 5.9	58 59.1	I. S.
21	L	18 50.42	2.115	0 52 18.10	137.09	11 9 2.8	796.8	67.98	16 3.7	58 50.8	
22	U	7 16.01	2.151	1 19 55.88	139.27	13 43 2.3	741.1	68.51	16 1.2	58 41.7	I. S.
22	L	19 42.07	2.192	1 48 1.82	141.76	16 4 43.8	673.8	69.12	15 58.5	58 31.7	
23	U	8 8.64	2.236	2 16 38.56	144.37	+18 11 50.5	+595.4	69.74	15 55.5	58 20.8	I. S.
23	L	20 35.72	2.278	2 45 46.27	146.88	20 2 12.8	506.6	70.33	15 52.3	58 9.2	
24	U	9 3.27	2.314	3 15 22.30	149.05	21 33 53.8	408.8	70.84	15 48.9	57 56.7	I. S.
24	L	21 31.21	2.340	3 45 21.16	150.64	22 45 15.1	303.7	71.20	15 45.3	57 43.3	
25	U	9 59.38	2.353	4 15 34.59	151.45	+23 35 3.2	+193.7	71.36	15 41.4	57 29.2	I. S.
25	L	22 27.63	2.351	4 45 52.20	151.32	24 2 36.1	+81.6	71.30	15 37.3	57 14.3	
26	U	10 55.75	2.333	5 16 2.36	150.20	24 7 45.6	-29.6	71.01	15 33.1	56 58.7	I. N.S.
26	L	23 23.55	2.298	5 45 53.28	148.13	23 50 59.4	137.2	70.48	15 28.7	56 42.7	
27	U	11 50.85	2.250	6 15 14.19	145.23	+23 13 17.2	-238.5	69.75	15 24.2	56 26.2	I. II. N.S.
28	L	0 17.51	2.191	6 43 56.17	141.68	22 16 6.9	831.6	68.86	15 19.7	56 9.6	
28	U	12 43.41	2.125	7 11 52.80	137.71	21 1 16.0	415.2	67.86	15 15.2	55 53.1	II. N.S.
29	L	1 8.50	2.056	7 39 0.45	133.55	19 30 44.5	488.3	66.81	15 10.8	55 37.0	
29	U	13 32.75	1.987	8 5 18.00	129.39	+17 46 37.1	-551.1	65.75	15 6.6	55 21.4	II. S.
30	L	1 56.19	1.921	8 30 46.71	125.43	15 50 57.8	608.7	64.73	15 2.6	55 6.7	
30	U	14 18.88	1.861	8 55 29.70	121.80	13 45 45.4	646.8	63.79	14 58.9	54 53.1	II. S.
31	L	2 40.88	1.897	9 19 31.53	118.59	11 32 50.2	681.1	62.95	14 55.6	54 41.0	
31	U	15 2.29	1.762	9 42 57.83	115.89	+9 13 53.6	-707.1	62.23	14 52.7	54 30.5	II. S.

Dec. 26, U Defective Illumination of N. 0''.00.  
Dec. 27, U Defective Illumination of II. 0''.05.

Dec. 27, U Defective Illumination of N. 0''.00.  
Dec. 28, U Defective Illumination of N. 0''.93.

MERCURY, 1917.  
FOR TRANSIT AT WASHINGTON.

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Jan

Fe



## FOR TRANSIT AT WASHINGTON.

Date	Time Mean Time	Apparent Right Ascension	Apparent Declination	Hour Angle	Right Ascension	H. of Moon from Mer.	Date	Time Mean Time	Apparent Right Ascension	Apparent Declination	Hour Angle	Right Ascension	H. of Moon from Mer.
July	1 23 13	7 55 19.94	-23 28 32.5	7	1 7 0.29		Aug. 12	17 1 43 11 25	1 29	-2 28 47.9	8.8	3.3	0.22
2	23 14	8 2 13.42	-23 34 17.9	7.1	1 7 0.29		13	1 43 11 28 59.77	1 50	28.7	8.9	3.4	0.23
3	23 15	8 11 17.14	-23 47 42.1	7.6	2 4 0.15		14	1 43 11 32 49.85	1 14	51.6	9.1	3.4	0.23
4	23 16	8 20 29.34	-23 54 37.1	8.0	2 4 0.15		15	1 42 11 36 11.97	0 40	7.1	9.2	3.5	0.23
5	23 17	8 29 44.45	-23 52 54.0	8.3	2 4 0.15		16	1 42 11 40 3.21	-0 6	17.5	9.3	3.5	0.24
6	23 18	8 39 12.74	-24 0 37.5	8.5	2 4 0.15		17	1 41 11 43 25.55	-0 28	32.5	9.5	3.6	0.24
7	23 19	8 48 40.42	-23 59 31.2	8.7	2 5 0.15		18	1 41 11 46 38.58	0 58	17.8	9.6	3.7	0.24
8	23 20	8 58 9.86	-23 55 37.0	8.7	2 5 0.15		19	1 40 11 49 40.91	1 28	52.7	9.8	3.7	0.25
9	23 21	9 7 39.01	-23 48 54.8	8.7	2 5 0.15		20	1 39 11 52 32.35	1 58	11.4	10.0	3.8	0.25
10	0 1 7 17	9 37	-23 39 25.5	8.6	2 5 0.15		21	1 37 11 55 12.29	2 26	7.5	10.1	3.8	0.26
11	0 1 7 26 30.25	-23 27 13.2	8.6	2 5 0.15			22	1 36 11 57 40.07	-2 52	34.0	10.3	3.9	0.26
12	0 2 7 35 49.31	-23 12 22.5	8.6	2 5 0.15			23	1 34 11 59 54.99	3 17	23.5	10.5	4.0	0.27
13	0 2 7 45 2.16	-22 54 59.8	8.6	2 5 0.15			24	1 32 12 1 56.30	3 40	27.8	10.7	4.0	0.27
14	0 2 7 54 7.76	-22 45 12.3	8.6	2 5 0.15			25	1 30 12 3 43.15	4 1	38.1	10.9	4.1	0.27
15	0 2 8 3 4.98	-22 13	-0 8.6	2 5 0.15			26	1 28 12 5 14.79	4 20	45.1	11.1	4.2	0.28
16	0 3 8 11 53.24	-21 48 55.8	8.6	2 5 0.15			Sept. 1	1 25 12 6 30.22	-4 37	38.7	11.3	4.3	0.28
17	0 3 8 20 31.87	-21 22 44.2	8.6	2 5 0.15			2	1 22 12 7 28.54	4 52	8.2	11.5	4.4	0.29
18	0 4 8 29 0.41	-20 54 42.4	8.6	2 5 0.15			3	1 19 12 8 8.80	5 4	2.1	11.7	4.4	0.30
19	0 4 8 37 18.55	-20 24 59.2	8.7	2 5 0.15			4	1 15 12 9 30.11	5 13	8.5	11.9	4.5	0.30
20	0 5 8 45 26.09	-19 53 43.4	8.7	2 5 0.15			5	1 11 12 8 31.59	5 19	15.0	12.1	4.6	0.31
21	0 5 8 53 22.91	-19 21	3.4	8.7	2 6 0.15		6	1 7 12 8 12.48	-5 22	9.2	12.3	4.7	0.31
22	0 5 9 1 8.95	-18 47	7.5	8.8	2 6 0.15		7	1 3 12 7 32.12	5 21	39.2	12.6	4.8	0.32
23	1 1 9 8 44.41	-18 12	3.4	8.8	2 6 0.15		8	0 58 12 6 30.05	5 17	33.0	12.8	4.8	0.32
24	1 1 9 16 9.24	-17 35 58.4	8.9	2 6 0.15			9	0 52 12 5 6.13	5 9	40.8	12.9	4.9	0.33
25	1 2 9 23 23.64	-16 58 59.6	8.9	2 6 0.15			10	0 47 12 3 20.51	4 57	54.4	13.1	5.0	0.33
26	1 11 9 30 27.82	-16 21 13.4	7.0	2 6 0.15			11	0 41 12 1 13.76	-4 42	8.6	13.3	5.0	0.34
27	1 14 9 37 21.93	-15 42 45.8	7.0	2 7 0.18			12	0 34 11 58 47.00	4 22	22.2	13.4	5.1	0.34
28	1 17 9 44 6.22	-15 3 43.0	7.1	2 7 0.19			13	0 27 11 56 1.89	3 58	39.0	13.6	5.1	0.34
29	1 19 9 50 40.92	-14 24 10.1	7.1	2 7 0.19			14	0 21 11 53 0.76	3 31	9.2	13.6	5.2	0.35
30	1 22 9 57 6.22	-13 44 12.4	7.2	2 7 0.19			15	0 13 11 49 46.56	3 0	9.1	13.7	5.2	0.35
Aug. 1	1 24 10 3 22.37	+13 3 54.6	7.3	2.8	0.19		16	0 6 11 46 22.91	-2 26	3.2	13.7	5.2	0.35
2	1 26 10 9 29.55	12 23 21.2	7.3	2.8	0.19		16	23 59 11 42 54.05	1 49	22.8	13.7	5.2	0.35
3	1 28 10 15 28.01	11 42 36.7	7.4	2.8	0.19		17	23 51 11 39 24.69	1 10	46.5	13.6	5.2	0.34
4	1 30 10 21 17.94	11 1 44.9	7.5	2.8	0.19		18	23 44 11 35 59.89	-0 30	59.0	13.5	5.1	0.34
5	1 32 10 26 59.49	10 20 49.8	7.6	2.9	0.19		19	23 37 11 32 44.95	+0 9	10.8	13.3	5.1	0.34
6	1 34 10 32 32.85	+ 9 39 55.2	7.7	2.9	0.20		20	23 30 11 29 45.03	+0 48	51.9	13.1	5.0	0.33
7	1 35 10 37 58.14	8 59 4.5	7.8	2.9	0.20		21	23 23 11 27 5.11	1 27	12.6	12.9	4.9	0.33
8	1 36 10 43 15.49	8 18 21.3	7.8	3.0	0.20		22	23 17 11 24 49.71	2 3	24.4	12.6	4.8	0.32
9	1 38 10 48 25.01	7 37 49.0	7.9	3.0	0.20		23	23 11 11 23 2.73	2 36	41.9	12.3	4.7	0.31
10	1 39 10 53 26.75	6 57 31.2	8.0	3.0	0.20		24	23 6 11 21 47.31	3 6	26.3	12.0	4.6	0.31
11	1 40 10 58 20.76	+ 6 17 30.9	8.1	3.1	0.21		25	23 2 11 21 5.83	+3 32	4.8	11.7	4.4	0.30
12	1 40 11 3 7.05	5 37 51.6	8.2	3.1	0.21		26	22 58 11 20 59.76	3 53	12.4	11.3	4.3	0.29
13	1 41 11 7 45.62	4 58 36.6	8.3	3.2	0.21		27	22 54 11 21 29.76	4 9	31.1	11.0	4.2	0.28
14	1 42 11 12 16.41	4 19 49.1	8.5	3.2	0.21		28	22 51 11 22 35.73	4 20	50.5	10.7	4.1	0.27
15	1 42 11 16 39.36	3 41 32.8	8.6	3.2	0.22		29	22 49 11 24 16.85	4 27	6.2	10.3	3.9	0.26
16	1 43 11 20 54.35	+ 3 3 51.3	8.7	3.3	0.22		30	22 47 11 26 31.71	+4 28	20.4	10.0	3.8	0.26
17	1 43 11 25 1.23	+ 2 26 47.9	8.8	3.3	0.22		Oct. 1	22 46 11 29 18.41	+4 24	40.0	9.7	3.7	0.25



## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Oct. 1	22 46	11 29 18.41	+ 4 24 40.0	9.7	3.7	0.25	Nov. 15	0 12	15 49 11.38	-21 7 35.1	6.1	2.3	0.17
2	22 45	11 32 34.70	4 16 16.2	9.4	3.6	0.24	16	0 15	15 55 37.87	21 33 2.3	6.2	2.3	0.17
3	22 45	11 36 18.06	4 3 23.8	9.1	3.5	0.23	17	0 17	16 2 5.64	21 57 25.8	6.2	2.3	0.17
4	22 45	11 40 25.83	3 46 20.3	8.9	3.4	0.23	18	0 20	16 8 34.68	22 20 44.0	6.2	2.4	0.17
5	22 46	11 44 55.28	3 25 25.0	8.6	3.3	0.22	19	0 22	16 15 4.95	22 42 55.4	6.2	2.4	0.17
6	22 47	11 49 43.78	+ 3 0 58.2	8.4	3.2	0.21	20	0 25	16 21 36.45	-23 3 58.6	6.3	2.4	0.17
7	22 48	11 54 48.72	2 33 21.1	8.2	3.1	0.21	21	0 28	16 28 9.10	23 23 52.3	6.3	2.4	0.17
8	22 49	12 0 7.73	2 2 54.6	8.0	3.0	0.20	22	0 30	16 34 42.84	23 42 34.8	6.3	2.4	0.17
9	22 51	12 5 38.58	1 29 59.1	7.8	3.0	0.20	23	0 33	16 41 17.58	24 0 4.8	6.4	2.4	0.18
10	22 53	12 11 19.28	0 54 54.3	7.7	2.9	0.19	24	0 35	16 47 53.20	24 16 21.1	6.4	2.4	0.18
11	22 55	12 17 8.05	+ 0 17 58.8	7.5	2.8	0.19	25	0 38	16 54 29.59	-24 31 22.2	6.4	2.4	0.18
12	22 57	12 23 3.33	- 0 20 30.0	7.4	2.8	0.19	26	0 41	17 1 6.54	24 45 6.3	6.5	2.5	0.18
13	22 59	12 29 3.82	1 0 16.4	7.2	2.8	0.18	27	0 43	17 7 43.89	24 57 32.3	6.5	2.5	0.18
14	23 1	12 35 8.35	1 41 5.9	7.1	2.7	0.18	28	0 46	17 14 21.39	25 8 38.8	6.6	2.5	0.18
15	23 3	12 41 15.99	2 22 45.1	7.0	2.7	0.18	29	0 49	17 20 58.79	25 18 24.4	6.7	2.5	0.19
16	23 5	12 47 25.95	- 3 5 2.4	6.9	2.6	0.18	30	0 51	17 27 35.78	-25 26 48.1	6.7	2.5	0.19
17	23 7	12 53 37.58	3 47 47.3	6.8	2.6	0.17	Dec. 1	0 54	17 34 12.01	25 33 48.3	6.8	2.6	0.19
18	23 10	12 59 50.37	4 30 50.2	6.7	2.6	0.17	2	0 57	17 40 47.07	25 39 23.9	6.9	2.6	0.19
19	23 12	13 6 3.92	5 14 3.0	6.7	2.5	0.17	3	0 59	17 47 20.51	25 43 34.1	6.9	2.6	0.19
20	23 14	13 12 17.90	5 57 18.1	6.6	2.5	0.17	4	1 2	17 53 51.79	25 46 17.9	7.0	2.7	0.20
21	23 16	13 18 32.10	- 6 40 29.2	6.5	2.5	0.17	5	1 4	18 0 20.34	-25 47 34.7	7.1	2.7	0.20
22	23 19	13 24 46.34	7 23 30.2	6.5	2.5	0.17	6	1 7	18 6 45.43	25 47 23.9	7.2	2.7	0.20
23	23 21	13 31 0.51	8 6 16.6	6.4	2.4	0.16	7	1 9	18 13 6.33	25 45 45.3	7.3	2.8	0.20
24	23 23	13 37 14.56	8 48 43.5	6.4	2.4	0.16	8	1 12	18 19 22.14	25 42 39.2	7.4	2.8	0.21
25	23 26	13 43 28.47	9 30 46.9	6.3	2.4	0.16	9	1 14	18 25 31.89	25 38 5.6	7.5	2.9	0.21
26	23 28	13 49 42.19	-10 12 23.3	6.3	2.4	0.16	10	1 16	18 31 34.43	-25 32 5.7	7.7	2.9	0.22
27	23 30	13 55 55.82	10 53 29.6	6.3	2.4	0.16	11	1 18	18 37 28.47	25 24 40.9	7.8	3.0	0.22
28	23 32	14 2 9.39	11 34 2.8	6.2	2.4	0.16	12	1 20	18 43 12.60	25 15 53.2	8.0	3.0	0.23
29	23 35	14 8 22.94	12 14 0.5	6.2	2.3	0.16	13	1 21	18 48 45.16	25 5 45.1	8.1	3.1	0.23
30	23 37	14 14 36.57	12 53 20.3	6.2	2.3	0.16	14	1 23	18 54 4.32	24 54 20.0	8.3	3.1	0.23
31	23 39	14 20 50.35	-13 32 0.0	6.2	2.3	0.16	15	1 24	18 59 8.02	-24 41 42.3	8.5	3.2	0.23
Nov. 1	23 41	14 27 4.41	14 9 57.6	6.1	2.3	0.16	16	1 25	19 3 53.96	24 27 57.3	8.7	3.3	0.24
2	23 44	14 33 18.80	14 47 11.4	6.1	2.3	0.16	17	1 25	19 8 19.53	24 13 11.6	8.9	3.4	0.25
3	23 46	14 39 33.64	15 23 39.7	6.1	2.3	0.16	18	1 25	19 12 21.93	23 57 32.7	9.1	3.4	0.25
4	23 48	14 45 49.03	15 59 20.8	6.1	2.3	0.16	19	1 25	19 15 58.06	23 41 9.0	9.3	3.5	0.26
5	23 51	14 52 5.06	-16 34 13.0	6.1	2.3	0.16	20	1 24	19 19 4.59	-23 24 10.7	9.6	3.7	0.27
6	23 53	14 58 21.81	17 8 15.0	6.1	2.3	0.16	21	1 23	19 21 37.99	23 6 49.0	9.9	3.8	0.27
7	23 55	15 4 39.38	17 41 25.4	6.1	2.3	0.16	22	1 21	19 23 34.66	22 49 16.1	10.2	3.9	0.28
8	23 58	15 10 57.85	18 13 42.7	6.1	2.3	0.16	23	1 18	19 24 51.02	22 31 44.3	10.5	4.0	0.29
10	0 0	15 17 17.30	18 45 5.5	6.1	2.3	0.16	24	1 15	19 25 23.68	22 14 27.0	10.8	4.1	0.29
11	0 3	15 23 37.79	-19 15 32.5	6.1	2.3	0.16	25	1 10	19 25 9.71	-21 57 37.6	11.1	4.2	0.30
12	0 5	15 29 59.41	19 45 2.3	6.1	2.3	0.16	26	1 5	19 24 6.85	21 41 28.0	11.4	4.3	0.31
13	0 7	15 36 22.19	20 13 33.5	6.1	2.3	0.16	27	1 0	19 22 14.03	21 26 9.8	11.7	4.5	0.32
14	0 10	15 42 46.17	20 41 5.0	6.1	2.3	0.17	28	0 53	19 19 31.58	21 11 51.8	12.0	4.6	0.32
15	0 12	15 49 11.38	21 7 35.1	6.1	2.3	0.17	29	0 46	19 16 1.60	20 58 41.8	12.3	4.7	0.33
16	0 15	15 55 37.87	-21 33 2.3	6.2	2.3	0.17	30	0 38	19 11 48.24	-20 46 44.7	12.6	4.8	0.34
17	0 17	16 2 5.64	-21 57 25.8	6.2	2.3	0.17	31	0 29	19 6 57.75	-20 36 4.3	12.8	4.8	0.34



FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	22 3	16 46 2.78	-21 11 13.0	6.2	6.0	0.43	Feb. 15	23 7	20 51 31.88	-18 26 38.9	5.5	5.3	0.38
1	22 5	16 51 19.66	21 22 39.8	6.2	6.0	0.43	16	23 8	20 56 37.79	18 8 6.9	5.5	5.3	0.37
2	22 6	16 56 37.44	21 33 29.8	6.1	5.9	0.42	17	23 10	21 1 42.55	17 49 3.7	5.4	5.3	0.37
3	22 7	17 1 56.05	21 43 42.2	6.1	5.9	0.42	18	23 11	21 6 46.19	17 29 29.9	5.4	5.3	0.37
4	22 9	17 7 15.47	21 53 16.8	6.1	5.9	0.42	19	23 12	21 11 48.66	17 9 26.4	5.4	5.3	0.37
5	22 10	17 12 35.67	-22 2 12.9	6.1	5.9	0.42	20	23 13	21 16 49.97	-16 48 53.7	5.4	5.3	0.37
6	22 11	17 17 56.59	22 10 30.2	6.0	5.9	0.42	21	23 14	21 21 50.13	16 27 52.6	5.4	5.3	0.37
7	22 13	17 23 18.19	22 18 8.1	6.0	5.9	0.42	22	23 15	21 26 49.12	16 6 23.7	5.4	5.2	0.37
8	22 14	17 28 40.42	22 25 6.4	6.0	5.8	0.42	23	23 16	21 31 46.95	15 44 27.9	5.4	5.2	0.36
9	22 16	17 34 3.25	22 31 24.6	6.0	5.8	0.42	24	23 17	21 36 43.62	15 22 6.0	5.4	5.2	0.36
10	22 17	17 39 26.61	-22 37 2.4	6.0	5.8	0.42	25	23 18	21 41 39.16	-14 59 18.5	5.4	5.2	0.36
11	22 19	17 44 50.45	22 41 59.4	6.0	5.8	0.42	26	23 19	21 46 33.56	14 36 6.2	5.4	5.2	0.36
12	22 20	17 50 14.73	22 46 15.6	5.9	5.8	0.42	27	23 20	21 51 26.83	14 12 29.8	5.3	5.2	0.36
13	22 22	17 55 39.38	22 49 50.5	5.9	5.7	0.42	28	23 21	21 56 18.99	13 48 30.3	5.3	5.2	0.36
14	22 23	18 1 4.35	22 52 43.9	5.9	5.7	0.41	Mar. 1	23 22	22 1 10.07	13 24 8.1	5.3	5.2	0.36
15	22 25	18 6 29.57	-22 54 55.6	5.9	5.7	0.41	2	23 22	22 6 0.08	-12 59 24.1	5.3	5.2	0.35
16	22 26	18 11 55.00	22 56 25.4	5.9	5.7	0.41	3	23 23	22 10 49.05	12 34 19.0	5.3	5.2	0.35
17	22 27	18 17 20.56	22 57 13.3	5.9	5.7	0.41	4	23 24	22 15 36.98	12 8 53.5	5.3	5.2	0.35
18	22 29	18 22 46.21	22 57 19.2	5.8	5.7	0.41	5	23 25	22 20 23.91	11 43 8.3	5.3	5.2	0.35
19	22 30	18 28 11.87	22 56 42.9	5.8	5.7	0.41	6	23 26	22 25 9.88	11 17 4.2	5.3	5.1	0.35
20	22 32	18 33 37.50	-22 55 24.6	5.8	5.6	0.41	7	23 27	22 29 54.88	-10 50 42.0	5.3	5.1	0.35
21	22 33	18 39 3.02	22 53 24.2	5.8	5.6	0.41	8	23 27	22 34 38.98	10 24 2.2	5.3	5.1	0.35
22	22 35	18 44 28.34	22 50 41.8	5.8	5.6	0.41	9	23 28	22 39 22.18	9 57 5.8	5.3	5.1	0.35
23	22 36	18 49 53.45	22 47 17.5	5.8	5.6	0.41	10	23 29	22 44 4.53	9 29 53.3	5.3	5.1	0.35
24	22 38	18 55 18.27	22 43 11.4	5.7	5.6	0.40	11	23 30	22 48 46.06	9 2 25.6	5.3	5.1	0.34
25	22 39	19 0 42.73	-22 38 23.5	5.7	5.6	0.40	12	23 30	22 53 26.79	- 8 34 43.5	5.2	5.1	0.34
26	22 41	19 6 6.78	22 32 54.2	5.7	5.6	0.40	13	23 31	22 58 6.76	8 6 47.4	5.2	5.1	0.34
27	22 42	19 11 30.37	22 26 43.7	5.7	5.5	0.40	14	23 32	23 2 46.02	7 38 38.4	5.2	5.1	0.34
28	22 44	19 16 53.44	22 19 52.2	5.7	5.5	0.40	15	23 33	23 7 24.59	7 10 16.9	5.2	5.1	0.34
29	22 45	19 22 15.93	22 12 19.9	5.7	5.5	0.40	16	23 33	23 12 2.50	6 41 44.0	5.2	5.1	0.34
30	22 46	19 27 37.81	-22 4 7.1	5.7	5.5	0.40	17	23 34	23 16 39.79	- 6 13 0.1	5.2	5.1	0.34
31	22 48	19 32 59.02	21 55 14.3	5.6	5.5	0.40	18	23 35	23 21 16.51	5 44 6.1	5.2	5.1	0.34
Feb. 1	22 49	19 38 19.53	21 45 41.6	5.6	5.5	0.40	19	23 35	23 25 52.68	5 15 2.6	5.2	5.1	0.34
2	22 51	19 43 39.27	21 35 29.6	5.6	5.5	0.39	20	23 36	23 30 28.34	4 45 50.7	5.2	5.1	0.34
3	22 52	19 48 58.23	21 24 38.6	5.6	5.5	0.39	21	23 37	23 35 3.53	4 16 30.8	5.2	5.0	0.34
4	22 53	19 54 16.35	-21 13 8.8	5.6	5.4	0.39	22	23 37	23 39 38.28	- 3 47 3.8	5.2	5.0	0.34
5	22 55	19 59 33.61	21 1 1.1	5.6	5.4	0.39	23	23 38	23 44 12.64	3 17 30.4	5.2	5.0	0.34
6	22 56	20 4 49.96	20 48 15.6	5.6	5.4	0.38	24	23 39	23 48 46.63	2 47 51.3	5.2	5.0	0.34
7	22 57	20 10 5.38	20 34 53.0	5.6	5.4	0.38	25	23 39	23 53 20.31	2 18 7.4	5.2	5.0	0.33
8	22 59	20 15 19.83	20 20 53.6	5.5	5.4	0.38	26	23 40	23 57 53.70	1 48 19.2	5.2	5.0	0.33
9	23 0	20 20 33.29	-20 6 18.2	5.5	5.4	0.38	27	23 40	0 2 26.84	- 1 18 27.6	5.2	5.0	0.33
10	23 1	20 25 45.72	19 51 7.2	5.5	5.4	0.38	28	23 41	0 6 59.79	0 48 33.2	5.2	5.0	0.33
11	23 2	20 30 57.11	19 35 21.2	5.5	5.4	0.38	29	23 42	0 11 32.57	- 0 18 36.8	5.2	5.0	0.33
12	23 4	20 36 7.44	19 19 0.7	5.5	5.3	0.38	30	23 42	0 16 5.24	+ 0 11 21.0	5.2	5.0	0.33
13	23 5	20 41 16.69	19 2 6.5	5.5	5.3	0.38	31	23 43	0 20 37.83	0 41 19.4	5.1	5.0	0.33
14	23 6	20 46 24.84	-18 44 38.9	5.5	5.3	0.38	Apr. 1	23 43	0 25 10.39	+ 1 11 17.7	5.1	5.0	0.33
15	23 7	20 51 31.88	-18 26 38.9	5.5	5.3	0.38	2	23 44	0 29 42.95	+ 1 41 15.3	5.1	5.0	0.33

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	23 43	0 25 10.39	+ 1 11 17.7	5.1	5.0	0.33	May 18	0 21	4 4 17.73	+20 40 33.9	5.1	5.0	0.35
2	23 44	0 29 42.95	1 41 15.3	5.1	5.0	0.33	19	0 22	4 9 26.26	20 56 50.9	5.1	5.0	0.35
3	23 45	0 34 15.56	2 11 11.4	5.1	5.0	0.33	20	0 23	4 14 35.84	21 12 33.3	5.1	5.0	0.35
4	23 45	0 38 48.28	2 41 5.3	5.1	5.0	0.33	21	0 25	4 19 46.46	21 27 40.4	5.1	5.0	0.36
5	23 46	0 43 21.13	3 10 56.3	5.1	5.0	0.33	22	0 26	4 24 58.08	21 42 11.7	5.1	5.0	0.36
6	23 46	0 47 54.17	+ 3 40 43.7	5.1	5.0	0.33	23	0 27	4 30 10.69	+21 56 6.4	5.1	5.0	0.36
7	23 47	0 52 27.42	4 10 26.8	5.1	5.0	0.33	24	0 28	4 35 24.24	22 9 24.2	5.1	5.0	0.36
8	23 48	0 57 0.94	4 40 5.0	5.1	5.0	0.33	25	0 30	4 40 38.71	22 22 4.5	5.1	5.0	0.36
9	23 48	1 1 34.78	5 9 37.4	5.1	5.0	0.33	26	0 31	4 45 54.06	22 34 6.7	5.1	5.0	0.36
10	23 49	1 6 8.96	5 39 3.3	5.1	5.0	0.33	27	0 32	4 51 10.26	22 45 30.2	5.2	5.0	0.36
11	23 49	1 10 43.54	+ 6 8 22.2	5.1	5.0	0.33	28	0 34	4 56 27.24	+22 56 14.6	5.2	5.0	0.36
12	23 50	1 15 18.55	6 37 33.1	5.1	5.0	0.33	29	0 35	5 1 44.98	23 6 19.5	5.2	5.0	0.36
13	23 51	1 19 54.04	7 6 35.4	5.1	5.0	0.33	30	0 36	5 7 3.44	23 15 44.6	5.2	5.0	0.36
14	23 51	1 24 30.04	7 35 28.5	5.1	5.0	0.33	31	0 38	5 12 22.58	23 24 29.2	5.2	5.0	0.37
15	23 52	1 29 6.59	8 4 11.4	5.1	5.0	0.33	June 1	0 39	5 17 42.33	23 32 33.0	5.2	5.0	0.37
16	23 53	1 33 43.74	+ 8 32 43.6	5.1	5.0	0.33	2	0 41	5 23 2.64	+23 39 55.8	5.2	5.0	0.37
17	23 53	1 38 21.52	9 1 4.2	5.1	5.0	0.33	3	0 42	5 28 23.48	23 46 37.0	5.2	5.0	0.37
18	23 54	1 42 59.94	9 29 12.6	5.1	5.0	0.33	4	0 43	5 33 44.80	23 52 36.5	5.2	5.0	0.37
19	23 55	1 47 39.06	9 57 7.9	5.1	5.0	0.33	5	0 45	5 39 6.52	23 57 54.0	5.2	5.1	0.37
20	23 56	1 52 18.91	10 24 49.5	5.1	5.0	0.34	6	0 46	5 44 28.62	24 2 29.3	5.2	5.1	0.37
21	23 56	1 56 59.51	+10 52 16.5	5.1	5.0	0.34	7	0 48	5 49 51.02	+24 6 22.0	5.2	5.1	0.37
22	23 57	2 1 40.90	11 19 28.2	5.1	5.0	0.34	8	0 49	5 55 13.67	24 9 32.0	5.2	5.1	0.37
23	23 58	2 6 23.11	11 46 23.9	5.1	5.0	0.34	9	0 50	6 0 36.53	24 11 59.2	5.2	5.1	0.37
24	23 59	2 11 6.16	12 13 2.8	5.1	5.0	0.34	10	0 52	6 5 59.51	24 13 43.3	5.2	5.1	0.37
25	23 59	2 15 50.08	12 39 24.2	5.1	5.0	0.34	11	0 53	6 11 22.58	24 14 44.3	5.3	5.1	0.37
27	0 0	2 20 34.90	+13 5 27.3	5.1	5.0	0.34	12	0 55	6 16 45.67	+24 15 2.2	5.3	5.1	0.37
28	0 1	2 25 20.64	13 31 11.4	5.1	5.0	0.34	13	0 56	6 22 8.72	24 14 37.0	5.3	5.1	0.37
29	0 2	2 30 7.33	13 56 35.8	5.1	5.0	0.34	14	0 58	6 27 31.65	24 13 28.4	5.3	5.1	0.37
30	0 3	2 34 55.01	14 21 39.7	5.1	5.0	0.34	15	0 59	6 32 54.42	24 11 36.8	5.3	5.1	0.37
May 1	0 3	2 39 43.67	14 46 22.4	5.1	5.0	0.34	16	1 1	6 38 16.96	24 9 1.9	5.3	5.1	0.37
2	0 4	2 44 33.35	+15 10 43.1	5.1	5.0	0.34	17	1 2	6 43 39.21	+24 5 44.2	5.3	5.1	0.37
3	0 5	2 49 24.06	15 34 41.1	5.1	5.0	0.34	18	1 3	6 49 1.10	24 1 43.6	5.3	5.2	0.37
4	0 6	2 54 15.84	15 58 15.6	5.1	5.0	0.34	19	1 5	6 54 22.58	23 57 0.3	5.3	5.2	0.37
5	0 7	2 59 8.69	16 21 26.0	5.1	5.0	0.34	20	1 6	6 59 43.60	23 51 34.4	5.3	5.2	0.38
6	0 8	3 4 2.64	16 44 11.5	5.1	5.0	0.34	21	1 8	7 5 4.08	23 45 26.1	5.3	5.2	0.38
7	0 9	3 8 57.67	+17 6 31.3	5.1	5.0	0.34	22	1 9	7 10 23.96	+23 38 36.0	5.4	5.2	0.38
8	0 10	3 13 53.82	17 28 24.8	5.1	5.0	0.34	23	1 10	7 15 43.19	23 31 4.1	5.4	5.2	0.38
9	0 11	3 18 51.10	17 49 51.3	5.1	5.0	0.34	24	1 12	7 21 1.72	23 22 50.7	5.4	5.2	0.38
10	0 12	3 23 49.52	18 10 50.0	5.1	5.0	0.35	25	1 13	7 26 19.48	23 13 56.4	5.4	5.2	0.38
11	0 13	3 28 49.07	18 31 20.1	5.1	5.0	0.35	26	1 14	7 31 36.44	23 4 21.4	5.4	5.2	0.38
12	0 14	3 33 49.77	+18 51 21.1	5.1	5.0	0.35	27	1 16	7 36 52.55	+22 54 6.1	5.4	5.2	0.38
13	0 15	3 38 51.61	19 10 52.1	5.1	5.0	0.35	28	1 17	7 42 7.76	22 43 10.9	5.4	5.2	0.38
14	0 16	3 43 54.58	19 29 52.4	5.1	5.0	0.35	29	1 18	7 47 22.01	22 31 36.3	5.4	5.3	0.38
15	0 18	3 48 58.70	19 48 21.5	5.1	5.0	0.35	30	1 20	7 52 35.29	22 19 22.8	5.4	5.3	0.38
16	0 19	3 54 3.93	20 6 18.5	5.1	5.0	0.35	July 1	1 21	7 57 47.53	22 6 30.9	5.5	5.3	0.38
17	0 20	3 59 10.28	+20 23 42.9	5.1	5.0	0.35	2	1 22	8 2 58.73	+21 53 0.8	5.5	5.3	0.38
18	0 21	4 4 17.73	+20 40 33.9	5.1	5.0	0.35	3	1 23	8 8 8.84	+21 38 53.4	5.5	5.3	0.38

VENUS, 1917.  
FOR TRANSIT AT WASHINGTON.

Date.		Wg Me Tic
July	h	
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## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.		Apparent Right Ascension.		
	h	m	h	m	s
Oct.	1	2 21	15	1	0.34
	2	2 22	15	5	42.58
	3	2 23	15	10	25.80
	4	2 23	15	15	10.02
	5	2 24	15	19	55.23
	6	2 25	15	24	41.43
	7	2 26	15	29	28.62
	8	2 27	15	34	16.79
	9	2 28	15	39	5.93
	10	2 29	15	43	56.03
	11	2 29	15	48	47.07
	12	2 30	15	53	39.03
	13	2 31	15	58	31.87
	14	2 32	16	3	25.60
	15	2 33	16	8	20.15
	16	2 34	16	13	15.51
	17	2 35	16	18	11.65
	18	2 36	16	23	8.50
	19	2 37	16	28	6.02
	20	2 38	16	33	4.16
	21	2 39	16	38	2.88
	22	2 40	16	43	2.12
	23	2 41	16	48	1.81
	24	2 42	16	53	1.90
	25	2 44	16	58	2.33
	26	2 45	17	3	3.02
	27	2 46	17	8	3.93
	28	2 47	17	13	4.97
	29	2 48	17	18	6.06
	30	2 49	17	23	7.18
	31	2 50	17	28	8.22
Nov.	1	2 51	17	33	9.12
	2	2 52	17	38	9.80
	3	2 53	17	43	10.19
	4	2 54	17	48	10.20
	5	2 55	17	53	9.78
	6	2 56	17	58	8.83
	7	2 57	18	3	7.29
	8	2 58	18	8	5.05
	9	2 59	18	13	2.04
	10	3 0	18	17	58.17
	11	3 1	18	22	53.36
	12	3 2	18	27	47.52
	13	3 3	18	32	40.56
	14	3 4	18	37	32.40
	15	3 5	18	42	22.93
	16	3 6	18	47	12.06

# MARS, 1917.

## FOR TRANSIT AT WASHINGTON.



Stellar magnitude at opposition in March, 1913, -1.1.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
n. 1	6 53	1 37 2.41	+ 8 45 51.2	1.9	20.3	1.46	Aug. 17	18 43	4 28 6.59	+20 54 14.9	1.7	18.2	1.39
2	6 49	1 37 11.70	8 47 4.7	1.9	20.3	1.46	18	18 40	4 28 38.52	20 55 21.4	1.7	18.3	1.39
3	6 45	1 37 21.75	8 48 22.5	1.9	20.2	1.45	19	18 36	4 29 9.84	20 56 26.0	1.7	18.3	1.39
4	6 42	1 37 32.55	8 49 44.4	1.9	20.1	1.45	20	18 33	4 29 40.56	20 57 28.9	1.7	18.4	1.40
5	6 38	1 37 44.08	8 51 10.6	1.9	20.1	1.44	21	18 29	4 30 10.67	20 58 30.0	1.7	18.4	1.40
6	6 34	1 37 56.35	+ 8 52 41.1	1.9	20.0	1.44	22	18 26	4 30 40.14	+20 59 29.5	1.7	18.5	1.41
7	6 30	1 38 9.35	8 54 15.6	1.9	19.9	1.43	23	18 22	4 31 8.99	21 0 27.2	1.7	18.5	1.41
8	6 27	1 38 23.08	8 55 54.0	1.9	19.9	1.43	24	18 19	4 31 37.20	21 1 23.1	1.7	18.6	1.41
9	6 23	1 38 37.53	8 57 36.6	1.8	19.8	1.42	25	18 15	4 32 4.76	21 2 17.4	1.7	18.6	1.42
10	6 19	1 38 52.71	8 59 23.1	1.8	19.7	1.42	26	18 12	4 32 31.68	21 3 10.0	1.8	18.7	1.42
11	6 16	1 39 8.59	+ 9 1 13.6	1.8	19.7	1.41	27	18 9	4 32 57.93	+21 4 0.8	1.8	18.8	1.43
12	6 12	1 39 25.18	9 3 7.9	1.8	19.6	1.41	28	18 5	4 33 23.52	21 4 50.1	1.8	18.8	1.43
13	6 8	1 39 42.47	9 5 6.1	1.8	19.5	1.40	29	18 2	4 33 48.43	21 5 37.5	1.8	18.9	1.44
14	6 5	1 40 0.46	9 7 8.1	1.8	19.5	1.40	30	17 58	4 34 12.66	21 6 23.4	1.8	18.9	1.44
15	6 1	1 40 19.12	9 9 13.9	1.8	19.4	1.40	31	17 54	4 34 36.21	21 7 7.5	1.8	19.0	1.45
16	5 57	1 40 38.49	+ 9 11 23.4	1.8	19.3	1.39	Sept. 1	17 51	4 34 59.05	+21 7 49.9	1.8	19.1	1.45
17	5 54	1 40 58.53	9 13 36.5	1.8	19.3	1.39	2	17 47	4 35 21.20	21 8 30.7	1.8	19.1	1.45
18	5 50	1 41 19.25	9 15 53.4	1.8	19.2	1.38	3	17 44	4 35 42.65	21 9 9.9	1.8	19.2	1.46
19	5 47	1 41 40.63	9 18 13.9	1.8	19.2	1.38	4	17 40	4 36 3.37	21 9 47.4	1.8	19.2	1.46
20	5 43	1 42 2.68	9 20 37.8	1.8	19.1	1.37	5	17 36	4 36 23.38	21 10 23.3	1.8	19.3	1.47
21	5 40	1 42 25.38	+ 9 23 5.3	1.8	19.0	1.37	6	17 33	4 36 42.64	+21 10 57.5	1.8	19.4	1.47
22	5 36	1 42 48.73	9 25 36.3	1.8	19.0	1.36	7	17 29	4 37 1.16	21 11 30.1	1.8	19.4	1.48
23	5 33	1 43 12.74	9 28 10.6	1.8	18.9	1.36	8	17 26	4 37 18.93	21 12 1.1	1.8	19.5	1.48
24	5 29	1 43 37.38	9 30 48.3	1.8	18.8	1.35	9	17 22	4 37 35.95	21 12 30.3	1.8	19.5	1.49
25	5 26	1 44 2.66	9 33 29.3	1.8	18.8	1.35	10	17 18	4 37 52.19	21 12 58.1	1.8	19.6	1.49
26	5 22	1 44 28.57	+ 9 36 13.5	1.8	18.7	1.35	11	17 15	4 38 7.67	+21 13 24.1	1.8	19.7	1.49
27	5 19	1 44 55.09	9 39 1.0	1.7	18.7	1.35	12	17 11	4 38 22.36	21 13 48.6	1.8	19.7	1.50
28	5 15	1 45 22.22	9 41 51.4	1.7	18.6	1.34	13	17 7	4 38 36.26	21 14 11.5	1.8	19.8	1.50
29	5 12	1 45 49.94	9 44 44.9	1.7	18.5	1.34	14	17 4	4 38 49.37	21 14 32.6	1.9	19.8	1.51
30	5 8	1 46 18.26	9 47 41.5	1.7	18.5	1.33	15	17 0	4 39 1.68	21 14 52.3	1.9	19.9	1.51
31	5 5	1 46 47.16	+ 9 50 41.0	1.7	18.4	1.33	16	16 56	4 39 13.18	+21 15 10.3	1.9	20.0	1.52
eb. 1	5 1	1 47 16.65	9 53 43.4	1.7	18.4	1.33	17	16 52	4 39 23.88	21 15 26.8	1.9	20.0	1.52
2	4 58	1 47 46.69	9 56 48.5	1.7	18.3	1.32	18	16 49	4 39 33.77	21 15 41.5	1.9	20.1	1.53
3	4 54	1 48 17.31	9 59 56.4	1.7	18.3	1.32	19	16 45	4 39 42.83	21 15 54.8	1.9	20.2	1.53
4	4 51	1 48 48.49	10 3 7.1	1.7	18.2	1.32	20	16 41	4 39 51.07	21 16 6.5	1.9	20.2	1.54
5	4 48	1 49 20.21	+10 6 20.4	1.7	18.2	1.31	21	16 37	4 39 58.49	+21 16 16.6	1.9	20.3	1.54
6	4 44	1 49 52.48	10 9 36.3	1.7	18.1	1.31	22	16 33	4 40 5.08	21 16 25.1	1.9	20.4	1.55
7	4 41	1 50 25.27	10 12 54.8	1.7	18.1	1.30	23	16 30	4 40 10.83	21 16 32.1	1.9	20.4	1.55
8	4 37	1 50 58.59	10 16 15.7	1.7	18.0	1.30	24	16 26	4 40 15.75	21 16 37.4	1.9	20.5	1.56
9	4 34	1 51 32.45	10 19 39.1	1.7	17.9	1.29	25	16 22	4 40 19.82	21 16 41.2	1.9	20.5	1.56
10	4 31	1 52 6.82	+10 23 4.9	1.7	17.9	1.29	26	16 18	4 40 23.06	+21 16 43.5	1.9	20.6	1.57
11	4 27	1 52 41.70	10 26 33.0	1.7	17.8	1.29	27	16 14	4 40 25.45	21 16 44.2	1.9	20.7	1.57
12	4 24	1 53 17.07	10 30 3.5	1.7	17.8	1.29	28	16 10	4 40 27.00	21 16 43.3	1.9	20.7	1.58
13	4 20	1 53 52.95	10 33 36.2	1.7	17.8	1.29	29	16 6	4 40 27.71	21 16 40.8	1.9	20.8	1.59
14	4 17	1 54 29.31	10 37 11.2	1.7	17.7	1.28	30	16 2	4 40 27.58	21 16 36.8	2.0	20.9	1.60
ug. 16	18 46	4 27 34.07	+20 53 6.8	1.7	18.2	1.38	Oct. 1	15 58	4 40 26.58	+21 16 31.3	2.0	20.9	1.60
17	18 43	4 28 6.59	+20 54 14.9	1.7	18.2	1.39	2	15 54	4 40 24.75	+21 16 24.2	2.0	21.0	1.61

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Oct. 1	15 58	4 40 26.58	+21 16 31.3	2.0	20.9	1.60	Nov. 15	12 47	4 26 16.32	+20 46 46.6	2.2	23.1	1.75
2	15 54	4 40 24.75	21 16 24.2	2.0	21.0	1.61	16	12 43	4 25 43.74	20 45 37.7	2.2	23.1	1.75
3	15 50	4 40 22.06	21 16 15.5	2.0	21.1	1.61	17	12 38	4 25 10.87	20 44 27.9	2.2	23.1	1.75
4	15 46	4 40 18.52	21 16 5.3	2.0	21.1	1.61	18	12 34	4 24 37.73	20 43 17.4	2.2	23.1	1.76
5	15 42	4 40 14.13	21 15 53.6	2.0	21.2	1.62	19	12 29	4 24 4.34	20 42 6.1	2.2	23.1	1.76
6	15 38	4 40 8.88	+21 15 40.2	2.0	21.2	1.62	20	12 25	4 23 30.73	+20 40 54.2	2.2	23.2	1.76
7	15 34	4 40 2.77	21 15 25.3	2.0	21.3	1.63	21	12 20	4 22 56.93	20 39 41.5	2.2	23.2	1.76
8	15 30	4 39 55.82	21 15 8.9	2.0	21.4	1.63	22	12 16	4 22 22.97	20 38 28.4	2.2	23.2	1.76
9	15 26	4 39 48.01	21 14 50.8	2.0	21.4	1.63	23	12 11	4 21 48.86	20 37 14.7	2.2	23.2	1.76
10	15 22	4 39 39.35	21 14 31.3	2.0	21.5	1.64	24	12 7	4 21 14.64	20 36 0.5	2.2	23.2	1.76
11	15 18	4 39 29.83	+21 14 10.2	2.0	21.5	1.64	25	12 2	4 20 40.33	+20 34 45.9	2.2	23.2	1.76
12	15 14	4 39 19.49	21 13 47.5	2.0	21.6	1.65	26	11 58	4 20 5.96	20 33 30.9	2.2	23.2	1.76
13	15 10	4 39 8.31	21 13 23.4	2.0	21.7	1.65	27	11 53	4 19 31.57	20 32 15.7	2.2	23.2	1.76
14	15 6	4 38 56.29	21 12 57.7	2.0	21.7	1.66	28	11 49	4 18 57.13	20 31 0.1	2.2	23.2	1.76
15	15 2	4 38 43.44	21 12 30.4	2.0	21.8	1.66	29	11 44	4 18 22.73	20 29 44.5	2.2	23.2	1.76
16	14 58	4 38 29.78	+21 12 1.6	2.0	21.8	1.66	30	11 40	4 17 48.36	+20 28 28.7	2.2	23.2	1.76
17	14 53	4 38 15.30	21 11 31.4	2.0	21.9	1.67	Dec. 1	11 35	4 17 14.06	20 27 12.9	2.2	23.2	1.75
18	14 49	4 38 0.02	21 10 59.7	2.0	21.9	1.67	2	11 31	4 16 39.85	20 25 57.1	2.2	23.2	1.75
19	14 45	4 37 43.93	21 10 26.5	2.1	22.0	1.68	3	11 26	4 16 5.75	20 24 41.4	2.2	23.2	1.75
20	14 41	4 37 27.07	21 9 51.6	2.1	22.1	1.68	4	11 22	4 15 31.80	20 23 25.8	2.2	23.1	1.75
21	14 37	4 37 9.43	+21 9 15.3	2.1	22.1	1.68	5	11 17	4 14 58.01	+20 22 10.4	2.2	23.1	1.75
22	14 32	4 36 51.03	21 8 37.5	2.1	22.2	1.69	6	11 13	4 14 24.41	20 20 55.4	2.2	23.1	1.75
23	14 28	4 36 31.88	21 7 58.3	2.1	22.2	1.69	7	11 8	4 13 51.03	20 19 40.5	2.2	23.1	1.75
24	14 24	4 36 11.98	21 7 17.6	2.1	22.3	1.70	8	11 4	4 13 17.89	20 18 26.2	2.2	23.1	1.75
25	14 20	4 35 51.36	21 6 35.6	2.1	22.3	1.70	9	10 59	4 12 45.02	20 17 12.4	2.2	23.1	1.75
26	14 15	4 35 30.01	+21 5 52.0	2.1	22.4	1.70	10	10 55	4 12 12.45	+20 15 59.2	2.2	23.0	1.74
27	14 11	4 35 7.98	21 5 7.1	2.1	22.4	1.71	11	10 51	4 11 40.19	20 14 46.7	2.2	23.0	1.74
28	14 7	4 34 45.25	21 4 20.6	2.1	22.5	1.71	12	10 46	4 11 8.29	20 13 34.8	2.2	23.0	1.74
29	14 2	4 34 21.85	21 3 32.7	2.1	22.5	1.71	13	10 42	4 10 36.77	20 12 23.6	2.2	23.0	1.74
30	13 58	4 33 57.78	21 2 43.6	2.1	22.5	1.71	14	10 37	4 10 5.62	20 11 13.5	2.1	22.9	1.73
31	13 54	4 33 33.06	+21 1 53.1	2.1	22.6	1.72	15	10 33	4 9 34.90	+20 10 4.3	2.1	22.9	1.73
Nov. 1	13 49	4 33 7.70	21 1 1.2	2.1	22.6	1.72	16	10 28	4 9 4.63	20 8 56.0	2.1	22.9	1.73
2	13 45	4 32 41.74	21 0 8.0	2.1	22.7	1.72	17	10 24	4 8 34.82	20 7 48.8	2.1	22.8	1.73
3	13 40	4 32 15.16	20 59 3.5	2.1	22.7	1.73	18	10 19	4 8 5.51	20 6 42.6	2.1	22.8	1.72
4	13 36	4 31 48.01	20 58 17.8	2.1	22.7	1.73	19	10 15	4 7 36.69	20 5 37.8	2.1	22.8	1.72
5	13 32	4 31 20.29	+20 57 20.8	2.1	22.8	1.73	20	10 11	4 7 8.42	+20 4 34.3	2.1	22.7	1.72
6	13 27	4 30 52.02	20 56 22.5	2.1	22.8	1.74	21	10 6	4 6 40.68	20 3 32.0	2.1	22.7	1.71
7	13 23	4 30 23.21	20 55 22.9	2.1	22.8	1.74	22	10 2	4 6 13.52	20 2 31.2	2.1	22.6	1.71
8	13 18	4 29 53.91	20 54 22.2	2.1	22.9	1.74	23	9 57	4 5 46.94	20 1 31.8	2.1	22.6	1.71
9	13 14	4 29 24.11	20 53 20.3	2.1	22.9	1.74	24	9 53	4 5 20.96	20 0 33.9	2.1	22.5	1.71
10	13 10	4 28 53.85	+20 52 17.2	2.1	22.9	1.74	25	9 49	4 4 55.59	+19 59 37.6	2.1	22.5	1.70
11	13 5	4 28 23.14	20 51 13.0	2.2	23.0	1.74	26	9 44	4 4 30.85	19 58 42.8	2.1	22.5	1.70
12	13 1	4 27 52.00	20 50 7.9	2.2	23.0	1.75	27	9 40	4 4 6.76	19 57 49.9	2.1	22.4	1.69
13	12 56	4 27 20.48	20 49 1.7	2.2	23.0	1.75	28	9 36	4 3 43.33	19 56 58.7	2.1	22.4	1.69
14	12 52	4 26 48.57	20 47 54.6	2.2	23.0	1.75	29	9 32	4 3 20.59	19 56 9.3	2.1	22.3	1.69
15	12 47	4 26 16.32	+20 46 46.6	2.2	23.1	1.75	30	9 27	4 2 58.53	+19 55 21.7	2.1	22.3	1.68
16	12 43	4 25 43.74	+20 45 37.7	2.2	23.1	1.75	31	9 23	4 2 37.17	+19 54 35.9	2.1	22.2	1.68

Stellar magnitude at opposition in November, 1917, -2.4.



FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	13 21	8 2 29.61	+20 38 45.0	1.1	9.5	0.74	Feb. 15	10 6	7 47 37.99	+21 24 12.4	1.1	9.4	0.74
1	13 17	8 2 10.59	20 39 47.1	1.1	9.5	0.74	16	10 1	7 47 22.29	21 24 58.0	1.1	9.4	0.74
2	13 13	8 1 51.40	20 40 49.7	1.1	9.5	0.75	17	9 57	7 47 6.92	21 25 42.7	1.1	9.4	0.74
3	13 8	8 1 32.03	20 41 52.5	1.1	9.6	0.75	18	9 53	7 46 51.87	21 26 26.3	1.1	9.4	0.74
4	13 4	8 1 12.51	20 42 55.6	1.1	9.6	0.75	19	9 49	7 46 37.15	21 27 9.0	1.1	9.4	0.74
5	13 0	8 0 52.83	+20 43 59.1	1.1	9.6	0.75	20	9 45	7 46 22.79	+21 27 50.6	1.1	9.4	0.74
6	12 56	8 0 33.01	20 45 2.7	1.1	9.6	0.75	21	9 40	7 46 8.77	21 28 31.2	1.1	9.4	0.74
7	12 51	8 0 13.05	20 46 6.6	1.1	9.6	0.75	22	9 36	7 45 55.11	21 29 10.9	1.1	9.4	0.73
8	12 47	7 59 52.98	20 47 10.5	1.1	9.6	0.75	23	9 32	7 45 41.83	21 29 49.5	1.1	9.3	0.73
9	12 43	7 59 32.81	20 48 14.6	1.1	9.6	0.75	24	9 28	7 45 28.92	21 30 27.0	1.1	9.3	0.73
10	12 39	7 59 12.54	+20 49 18.8	1.1	9.6	0.75	25	9 24	7 45 16.39	+21 31 3.5	1.1	9.3	0.73
11	12 34	7 58 52.19	20 50 23.2	1.1	9.6	0.75	26	9 20	7 45 4.25	21 31 39.0	1.1	9.3	0.73
12	12 30	7 58 31.75	20 51 27.5	1.1	9.6	0.75	27	9 16	7 44 52.51	21 32 13.2	1.1	9.3	0.73
13	12 26	7 58 11.26	20 52 31.8	1.1	9.6	0.75	28	9 11	7 44 41.16	21 32 46.4	1.1	9.3	0.73
14	12 21	7 57 50.72	20 53 35.9	1.1	9.6	0.75	Mar. 1	9 7	7 44 30.22	21 33 18.5	1.1	9.3	0.73
15	12 17	7 57 30.13	+20 54 40.1	1.1	9.6	0.75	2	9 3	7 44 19.68	+21 33 49.4	1.1	9.2	0.73
16	12 13	7 57 9.53	20 55 44.2	1.1	9.6	0.75	3	8 59	7 44 9.57	21 34 19.3	1.1	9.2	0.73
17	12 9	7 56 48.91	20 56 48.1	1.1	9.6	0.75	4	8 55	7 43 59.87	21 34 48.0	1.0	9.2	0.73
18	12 4	7 56 28.28	20 57 51.7	1.1	9.6	0.75	5	8 51	7 43 50.59	21 35 15.7	1.0	9.2	0.72
19	12 0	7 56 7.66	20 58 55.2	1.1	9.6	0.75	6	8 47	7 43 41.74	21 35 42.3	1.0	9.2	0.72
20	11 56	7 55 47.06	+20 59 58.4	1.1	9.6	0.75	7	8 43	7 43 33.34	+21 36 7.7	1.0	9.2	0.72
21	11 52	7 55 26.50	21 1 1.3	1.1	9.6	0.75	8	8 39	7 43 25.35	21 36 32.0	1.0	9.2	0.72
22	11 47	7 55 5.99	21 2 4.0	1.1	9.6	0.75	9	8 35	7 43 17.80	21 36 55.1	1.0	9.2	0.72
23	11 43	7 54 45.54	21 3 6.3	1.1	9.6	0.75	10	8 31	7 43 10.69	21 37 17.2	1.0	9.1	0.72
24	11 39	7 54 25.15	21 4 8.1	1.1	9.6	0.75	11	8 27	7 43 4.03	21 37 38.1	1.0	9.1	0.72
25	11 34	7 54 4.85	+21 5 9.5	1.1	9.6	0.75	12	8 23	7 42 57.81	+21 37 57.8	1.0	9.1	0.72
26	11 30	7 53 44.65	21 6 10.5	1.1	9.6	0.75	13	8 18	7 42 52.04	21 38 16.5	1.0	9.1	0.71
27	11 26	7 53 24.56	21 7 11.0	1.1	9.6	0.75	14	8 14	7 42 46.72	21 38 33.9	1.0	9.1	0.71
28	11 22	7 53 4.60	21 8 10.9	1.1	9.6	0.75	15	8 10	7 42 41.86	21 38 50.2	1.0	9.1	0.71
29	11 17	7 52 44.76	21 9 10.3	1.1	9.6	0.75	16	8 6	7 42 37.46	21 39 5.3	1.0	9.0	0.71
30	11 13	7 52 25.07	+21 10 9.1	1.1	9.6	0.75	17	8 2	7 42 33.50	+21 39 19.4	1.0	9.0	0.71
31	11 9	7 52 5.52	21 11 7.3	1.1	9.6	0.75	18	7 58	7 42 30.01	21 39 32.1	1.0	9.0	0.71
Feb. 1	11 5	7 51 46.16	21 12 4.9	1.1	9.6	0.75	19	7 54	7 42 26.99	21 39 43.8	1.0	9.0	0.71
2	11 0	7 51 26.96	21 13 1.7	1.1	9.6	0.75	20	7 51	7 42 24.43	21 39 54.4	1.0	9.0	0.71
3	10 56	7 51 7.95	21 13 58.0	1.1	9.5	0.75	21	7 47	7 42 22.34	21 40 3.7	1.0	9.0	0.71
4	10 52	7 50 49.14	+21 14 53.5	1.1	9.5	0.75	22	7 43	7 42 20.71	+21 40 11.8	1.0	9.0	0.70
5	10 48	7 50 30.53	21 15 48.4	1.1	9.5	0.75	23	7 39	7 42 19.56	21 40 18.8	1.0	8.9	0.70
6	10 43	7 50 12.14	21 16 42.5	1.1	9.5	0.75	24	7 35	7 42 18.88	21 40 24.6	1.0	8.9	0.70
7	10 39	7 49 53.98	21 17 35.7	1.1	9.5	0.74	25	7 31	7 42 18.67	21 40 29.2	1.0	8.9	0.70
8	10 35	7 49 36.05	21 18 28.3	1.1	9.5	0.74	26	7 27	7 42 18.93	21 40 32.6	1.0	8.9	0.70
9	10 31	7 49 18.38	+21 19 20.0	1.1	9.5	0.74	27	7 23	7 42 19.66	+21 40 34.9	1.0	8.9	0.70
10	10 27	7 49 0.95	21 20 10.8	1.1	9.5	0.74	28	7 19	7 42 20.86	21 40 36.0	1.0	8.9	0.70
11	10 22	7 48 43.80	21 21 0.9	1.1	9.5	0.74	29	7 15	7 42 22.53	21 40 36.0	1.0	8.8	0.69
12	10 18	7 48 26.91	21 21 50.1	1.1	9.5	0.74	30	7 11	7 42 24.66	21 40 34.7	1.0	8.8	0.69
13	10 14	7 48 10.31	21 22 38.5	1.1	9.5	0.74	31	7 7	7 42 27.26	21 40 32.4	1.0	8.8	0.69
14	10 10	7 47 54.00	+21 23 25.9	1.1	9.5	0.74	Apr. 1	7 3	7 42 30.33	+21 40 28.8	1.0	8.8	0.69
15	10 6	7 47 37.99	+21 24 12.4	1.1	9.4	0.74	2	7 0	7 42 33.85	+21 40 24.1	1.0	8.8	0.68

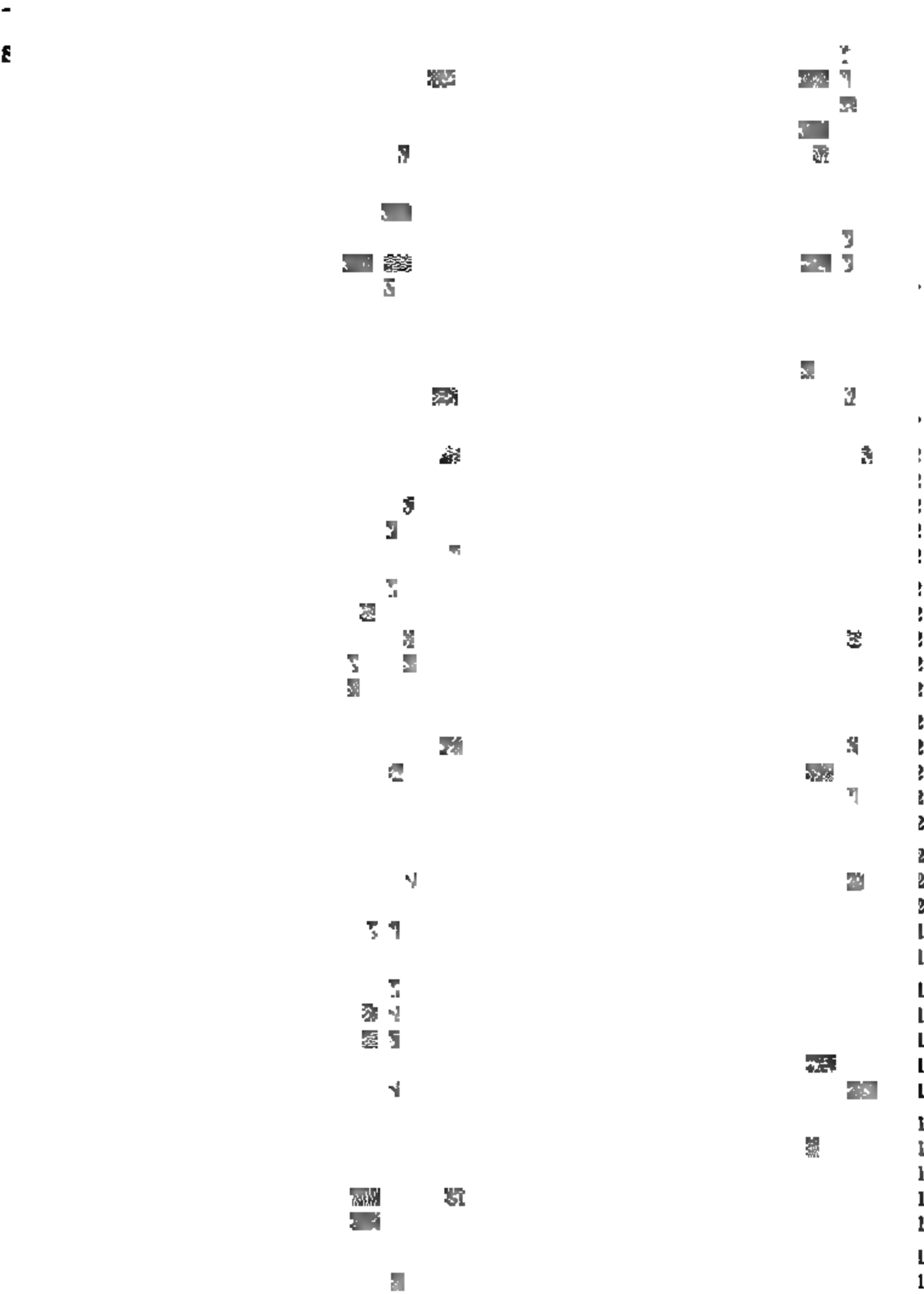
Stellar magnitude at opposition in January, 1917, -0.1.



SATURN, 1917.  
FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

URANUS, 1917.  
FOR TRANSIT AT WASHINGTON.



Stellar magnitude at opposition, in August, 1917, 6.6

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Jan. 0	13 44	8 25 33.79	+19 0 9.6	0.3	1.3	0.09	Feb. 15	10 38	8 20 25.84	+19 18 5.2	0.3	1.3	0.09
1	13 40	8 25 27.56	19 0 31.5	0.3	1.3	0.09	16	10 34	8 20 19.64	19 18 26.8	0.3	1.3	0.09
2	13 36	8 25 21.27	19 0 53.7	0.3	1.3	0.09	17	10 30	8 20 13.51	19 18 48.1	0.3	1.3	0.09
3	13 32	8 25 14.94	19 1 16.0	0.3	1.3	0.09	18	10 26	8 20 7.46	19 19 9.2	0.3	1.3	0.09
4	13 28	8 25 8.54	19 1 38.5	0.3	1.3	0.09	19	10 22	8 20 1.46	19 19 30.0	0.3	1.3	0.09
5	13 24	8 25 2.09	+19 2 1.3	0.3	1.3	0.09	20	10 18	8 19 55.54	+19 19 50.6	0.3	1.3	0.09
6	13 20	8 24 55.59	19 2 24.1	0.3	1.3	0.09	21	10 14	8 19 49.70	19 20 10.9	0.3	1.3	0.09
7	13 16	8 24 49.04	19 2 47.1	0.3	1.3	0.09	22	10 10	8 19 43.92	19 20 31.1	0.3	1.3	0.09
8	13 12	8 24 42.44	19 3 10.3	0.3	1.3	0.09	23	10 6	8 19 38.23	19 20 50.8	0.3	1.3	0.09
9	13 8	8 24 35.81	19 3 33.6	0.3	1.3	0.09	24	10 2	8 19 32.63	19 21 10.4	0.3	1.3	0.09
10	13 4	8 24 29.14	+19 3 57.0	0.3	1.3	0.09	25	9 58	8 19 27.10	+19 21 29.6	0.3	1.3	0.09
11	13 0	8 24 22.42	19 4 20.5	0.3	1.3	0.09	26	9 54	8 19 21.66	19 21 48.6	0.3	1.3	0.09
12	12 56	8 24 15.67	19 4 44.2	0.3	1.3	0.09	27	9 50	8 19 16.31	19 22 7.3	0.3	1.3	0.09
13	12 52	8 24 8.90	19 5 7.9	0.3	1.3	0.09	28	9 46	8 19 11.05	19 22 25.6	0.3	1.3	0.09
14	12 48	8 24 2.09	19 5 31.7	0.3	1.3	0.09	Mar. 1	9 42	8 19 5.88	19 22 43.6	0.3	1.3	0.09
15	12 43	8 23 55.26	+19 5 55.7	0.3	1.3	0.09	2	9 38	8 19 0.80	+19 23 1.4	0.3	1.3	0.09
16	12 39	8 23 48.39	19 6 19.7	0.3	1.3	0.09	3	9 34	8 18 55.82	19 23 18.8	0.3	1.3	0.09
17	12 35	8 23 41.51	19 6 43.9	0.3	1.3	0.09	4	9 30	8 18 50.93	19 23 35.9	0.3	1.3	0.09
18	12 31	8 23 34.60	19 7 8.0	0.3	1.3	0.09	5	9 26	8 18 46.15	19 23 52.7	0.3	1.3	0.09
19	12 27	8 23 27.69	19 7 32.1	0.3	1.3	0.09	6	9 22	8 18 41.47	19 24 9.1	0.3	1.3	0.09
20	12 23	8 23 20.77	+19 7 56.3	0.3	1.3	0.09	7	9 18	8 18 36.89	+19 24 25.2	0.3	1.3	0.09
21	12 19	8 23 13.84	19 8 20.6	0.3	1.3	0.09	8	9 14	8 18 32.41	19 24 40.9	0.3	1.3	0.09
22	12 15	8 23 6.90	19 8 44.8	0.3	1.3	0.09	9	9 10	8 18 28.05	19 24 56.4	0.3	1.3	0.09
23	12 11	8 22 59.95	19 9 9.0	0.3	1.3	0.09	10	9 6	8 18 23.79	19 25 11.4	0.3	1.3	0.09
24	12 7	8 22 53.01	19 9 33.3	0.3	1.3	0.09	11	9 2	8 18 19.63	19 25 26.0	0.3	1.3	0.09
25	12 3	8 22 46.07	+19 9 57.5	0.3	1.3	0.09	12	8 58	8 18 15.60	+19 25 40.3	0.3	1.3	0.09
26	11 59	8 22 39.13	19 10 21.7	0.3	1.3	0.09	13	8 54	8 18 11.67	19 25 54.3	0.3	1.3	0.09
27	11 55	8 22 32.19	19 10 45.9	0.3	1.3	0.09	14	8 50	8 18 7.85	19 26 7.9	0.3	1.3	0.09
28	11 51	8 22 25.27	19 11 10.0	0.3	1.3	0.09	15	8 46	8 18 4.15	19 26 21.1	0.3	1.3	0.09
29	11 47	8 22 18.37	19 11 34.1	0.3	1.3	0.09	16	8 42	8 18 0.56	19 26 33.9	0.3	1.3	0.09
30	11 43	8 22 11.49	+19 11 58.0	0.3	1.3	0.09	17	8 38	8 17 57.10	+19 26 46.3	0.3	1.3	0.09
31	11 39	8 22 4.62	19 12 21.9	0.3	1.3	0.09	18	8 34	8 17 53.76	19 26 58.4	0.3	1.3	0.09
Feb. 1	11 35	8 21 57.78	19 12 45.7	0.3	1.3	0.09	19	8 30	8 17 50.53	19 27 10.0	0.3	1.3	0.09
2	11 31	8 21 50.96	19 13 9.4	0.3	1.3	0.09	20	8 26	8 17 47.41	19 27 21.2	0.3	1.3	0.09
3	11 27	8 21 44.18	19 13 32.9	0.3	1.3	0.09	21	8 22	8 17 44.43	19 27 32.0	0.3	1.3	0.09
4	11 23	8 21 37.42	+19 13 56.5	0.3	1.3	0.09	22	8 18	8 17 41.58	+19 27 42.4	0.3	1.3	0.09
5	11 19	8 21 30.69	19 14 19.9	0.3	1.3	0.09	23	8 14	8 17 38.85	19 27 52.4	0.3	1.3	0.09
6	11 15	8 21 24.01	19 14 43.1	0.3	1.3	0.09	24	8 10	8 17 36.24	19 28 2.0	0.3	1.2	0.09
7	11 11	8 21 17.36	19 15 6.2	0.3	1.3	0.09	25	8 6	8 17 33.77	19 28 11.1	0.3	1.2	0.09
8	11 6	8 21 10.75	19 15 29.2	0.3	1.3	0.09	26	8 2	8 17 31.43	19 28 19.8	0.3	1.2	0.09
9	11 2	8 21 4.18	+19 15 52.1	0.3	1.3	0.09	27	7 58	8 17 29.22	+19 28 28.1	0.3	1.2	0.09
10	10 58	8 20 57.65	19 16 14.7	0.3	1.3	0.09	28	7 54	8 17 27.13	19 28 36.1	0.3	1.2	0.09
11	10 54	8 20 51.18	19 16 37.2	0.3	1.3	0.09	29	7 50	8 17 25.18	19 28 43.6	0.3	1.2	0.09
12	10 50	8 20 44.76	19 16 59.5	0.3	1.3	0.09	30	7 46	8 17 23.36	19 28 50.6	0.3	1.2	0.09
13	10 46	8 20 38.40	19 17 21.6	0.3	1.3	0.09	31	7 42	8 17 21.68	19 28 57.2	0.3	1.2	0.09
14	10 42	8 20 32.10	+19 17 43.6	0.3	1.3	0.09	Apr. 1	7 38	8 17 20.12	+19 29 3.4	0.3	1.2	0.09
15	10 38	8 20 25.84	+19 18 5.2	0.3	1.3	0.09	2	7 34	8 17 18.70	+19 29 9.1	0.3	1.2	0.09

Stellar magnitude at opposition in January, 1917, 7.7.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	
	h	m
Apr.	1	7 38
	2	7 34
	3	7 30
	4	7 26
	5	7 22
	6	7 18
	7	7 14
	8	7 10
	9	7 7
	10	7 3
	11	6 59
	12	6 55
	13	6 51
	14	6 47
	15	6 43
	16	6 39
	17	6 35
	18	6 31
	19	6 27
	20	6 23
Oct.	20	18 40
	21	18 36
	22	18 32
	23	18 28
	24	18 24
	25	18 20
	26	18 17
	27	18 13
	28	18 9
	29	18 5
	30	18 1
Nov.	31	17 57
	1	17 53
	2	17 49
	3	17 45
	4	17 41
	5	17 37
	6	17 33
	7	17 30
	8	17 26
	9	17 22
	10	17 18
	11	17 14
	12	17 10
	13	17 6
	14	17 2
15	16 58	

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PART III.

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PHENOMENA.

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In the year 1917 there will be seven eclipses, four of the Sun and three of the Moon.

I.—*A Total Eclipse of the Moon*, 1917, January 7, visible at Washington; the beginning visible generally in central and western Europe, northwestern Africa, North and South America, and the central and eastern portions of the Pacific Ocean; the ending visible generally in North America, northwestern South America, northern and northeastern Asia, and eastern Australia.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\varphi$ in right ascension, January 7				d	h	m	s
				7	19	37	51.9
Sun's right ascension	h	m	s	Hourly motion			
	19	15	47.52	• 10.92			
Moon's right ascension	7	15	47.52	Hourly motion			
	•	'	"	' "			
Sun's declination	−22	18	27.7	Hourly motion			
				+ 0 19.7			
Moon's declination	+22	31	53.8	Hourly motion			
				− 6 34.0			
Sun's equa. hor. parallax	8.9			Sun's true semidiameter			
				16 15.9			
Moon's equa. hor. parallax	54	9.8		Moon's true semidiameter			
				14 44.8			

CIRCUMSTANCES OF THE ECLIPSE.

		d	h	m		
Moon enters penumbra	Jan.	7	16	35.7	} Greenwich Mean Time.	
Moon enters shadow		7	17	50.4		
Total eclipse begins		7	19	0.4		
Middle of the eclipse		7	19	44.6		
Total eclipse ends		7	20	28.8		
Moon leaves shadow		7	21	38.6		
Moon leaves penumbra		7	22	52.7		
Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon Being in the Zenith in Longitude from Greenwich				and in Latitude
First	117 to E.	+	86	48	+22 43	
Last	91 to W.	+	142	0	+22 18	

Magnitude of the eclipse=1.369 (Moon's diameter=1.0).

II.—*A Partial Eclipse of the Sun*, 1917, January 22, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\zeta$ in right ascension, January 22				d	h	m	s
				22	20	8	29.8
Sun and Moon's R. A	h	m	s	Hourly motions			
	20	20	15.52	10.51 and 152.97			
	•	'	"	' "			
Sun's declination	−19	32	52.6	Hourly motion			
				+ 0 34.9			
Moon's declination	−18	18	23.6	Hourly motion			
				+12 3.2			
Sun's equa. hor. parallax	8.9			Sun's true semidiameter			
				16 14.8			
Moon's equa. hor. parallax	61	26.7		Moon's true semidiameter			
				16 43.7			

CIRCUMSTANCES OF THE ECLIPSE.

		Greenwich Mean Time.		Longitude from Greenwich.		Latitude.	
		d	h	m	•	'	•
Eclipse begins	Jan.	22	17	43.4	−18	2.1	+28 1.6
Greatest eclipse		22	19	28.3	−25	42.7	+63 15.2
Eclipse ends		22	21	13.0	−95	56.2	+60 28.0

Magnitude of greatest eclipse=0.725 (Sun's diameter=1.0).

III.—A Partial Eclipse of the Sun, 1917, June 18–19, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, June 19				d	h	m	s
				19	1	4	37.1
Sun and Moon's R. A.	h	m	s	Hourly motions			
	5	49	44.49	10.40 and 137.78			
	.	'	"				
Sun's declination	+23	25	46.2	Hourly motion			
				+ 0 2.5			
Moon's declination	+24	37	15.9	Hourly motion			
				– 2 15.1			
Sun's equa. hor. parallax			8.7	Sun's true semidiameter			
				15 44.3			
Moon's equa. hor. parallax	55	34.9		Moon's true semidiameter			
				15 8.0			

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.			Longitude from Greenwich.		Latitude.	
	d	h	m	.	'	.	'
Eclipse begins	June	18	23 36.0	+118	43.2	+52	54.9
Greatest eclipse		19	1 16.2	–150	6.0	+66	10.5
Eclipse ends		19	2 56.5	– 72	35.0	+45	48.3

Magnitude of greatest eclipse=0.473 (Sun's diameter=1.0).

IV.—A Total Eclipse of the Moon, 1917, July 4, invisible at Washington; the beginning visible generally in Asia except the northeastern portion, Australia, Africa, Europe except the northwestern portions, and the south Atlantic Ocean; the ending visible generally in western Australia, southwestern Asia, Europe, Africa, and South America.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, July 4				d	h	m	s
				4	9	41	46.3
Sun's right ascension	h	m	s	Hourly motion			
	6	53	27.05	10.30			
Moon's right ascension	18	53	27.05	Hourly motion			
	.	'	"				
Sun's declination	+22	52	53.9	Hourly motion			
				– 0 13.1			
Moon's declination	–22	44	11.1	Hourly motion			
				+ 6 45.3			
Sun's equa. hor. parallax			8.7	Sun's true semidiameter			
				15 43.9			
Moon's equa. hor. parallax	60	17.1		Moon's true semidiameter			
				16 24.8			

CIRCUMSTANCES OF THE ECLIPSE.

	d	h	m	} Greenwich Mean Time.
Moon enters penumbra	July	4	6 55.8	
Moon enters shadow		4	7 52.2	
Total eclipse begins		4	8 50.6	
Middle of the eclipse		4	9 38.9	
Total eclipse ends		4	10 27.2	
Moon leaves shadow		4	11 25.4	
Moon leaves penumbra		4	12 21.3	

Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith in Longitude from Greenwich		and in Latitude	
	.	.	'	.	'
First	87 to E.	–61	52	–22	56
Last	109 to W.	–10	45	–22	32

Magnitude of the eclipse=1.625 (Moon's diameter=1.0).



V.—*A Partial Eclipse of the Sun*, 1917, July 18, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\zeta$ in right ascension, July				d	h	m	s
				18	15	34	16.6
Sun and Moon's R. A.	h	m	s	Hourly motions			
	7	51	28.79	10.05 and 123.17			
Sun's declination	+20	58	48.8	Hourly motion			
Moon's declination	+19	33	20.4	Hourly motion			
Sun's equa. hor. parallax	8.7			Sun's true semidiameter			
Moon's equa. hor. parallax	54	28.4		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.			Longitude from Greenwich.		Latitude.
	d	h	m	°	'	°
Eclipse begins	July	18	13 56.5	− 93	30.7	−53 24.3
Greatest eclipse		18	14 42.5	−101	52.2	−63 43.5
Eclipse ends		18	15 28.3	−124	27.5	−68 56.6

Magnitude of greatest eclipse=0.086 (Sun's diameter=1.0).

VI.—*An Annular Eclipse of the Sun*, 1917, December 13, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\zeta$ in right ascension, December				d	h	m	s
				13	21	23	24.0
Sun and Moon's R. A.	h	m	s	Hourly motions			
	17	24	27.34	11.05 and 149.88			
Sun's declination	−23	11	54.5	Hourly motion			
Moon's declination	−24	4	57.9	Hourly motion			
Sun's equa. hor. parallax	8.9			Sun's true semidiameter			
Moon's equa. hor. parallax	58	2.5		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.			Longitude from Greenwich.		Latitude.
	d	h	m	°	'	°
Eclipse begins	Dec.	13	19 9.7	+ 36	6.9	−34 48.4
Central eclipse begins		13	20 43.8	+ 87	52.7	−59 1.9
Central eclipse at local apparent midnight		13	21 23.4	+142	12.8	−89 56.6
Central eclipse ends		13	22 10.5	−155	41.2	−56 7.8
Eclipse ends		13	23 44.5	−107	27.1	−31 1.9

VII.—*A Total Eclipse of the Moon*, 1917, December 27, visible at Washington; the beginning visible generally in North and South America, throughout the Pacific Ocean, and the extreme northeastern portion of Asia; the ending visible generally in North America, throughout the Pacific Ocean, in eastern Asia, and Australia.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\varphi$ in right ascension, December 27				d	h	m	s
				27	21	53	49.2
Sun's right ascension	h	m	s	Hourly motion			
	18	26	39.29	11.08			
Moon's right ascension	6	26	39.29	Hourly motion			
	.	'	"	138.74			
Sun's declination	-23	18	30.5	Hourly motion			
Moon's declination	+22	52	58.5	+ 0 7.1			
Sun's equa. hor. parallax	8.9			Hourly motion			
Moon's equa. hor. parallax	56	20.1		- 4 26.5			
				Sun's true semidiameter			
				16 15.9			
				Moon's true semidiameter			
				15 20.3			

CIRCUMSTANCES OF THE ECLIPSE.

	d	h	m	} Greenwich Mean Time.
Moon enters penumbra	Dec. 27	18	53.5	
Moon enters shadow	27	20	5.1	
Total eclipse begins	27	21	38.1	
Middle of the eclipse	27	21	46.3	
Total eclipse ends	27	21	54.6	
Moon leaves shadow	27	23	27.4	
Moon leaves penumbra	27	24	38.8	

Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith	
		in Longitude from Greenwich	and in Latitude
First	72 to E.	+121 52	+23 1
Last	55 to W.	+170 39	+22 46

Magnitude of the eclipse=1.011 (Moon's diameter=1.0).

The regions within which the first, second, and fourth eclipses of the Sun are visible are laid down on the accompanying charts, from which, by means of the dotted lines, the Greenwich mean times of beginning and ending at any place may be found with an uncertainty which will vary from three or four minutes for a high Sun to fifteen or twenty minutes when the Sun is near the horizon.

BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JANUARY 22.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>z</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
<div>h m</div>					<div>° ′</div>	
17 40	−1.36546	+0.75266	−9.52507	+9.97415	262 1.8	+0.53795
50	1.27351	0.78377	9.52504	9.97415	264 31.8	0.53796
18 0	−1.18156	+0.81488	−9.52501	+9.97416	267 1.8	+0.53796
10	1.08961	0.84600	9.52497	9.97416	269 31.7	0.53796
20	0.99765	0.87713	9.52494	9.97416	272 1.7	0.53797
30	0.90570	0.90826	9.52491	9.97417	274 31.7	0.53797
40	0.81374	0.93939	9.52487	9.97417	277 1.7	0.53797
50	0.72179	0.97053	9.52484	9.97418	279 31.7	0.53797
19 0	−0.62983	+1.00167	−9.52481	+9.97418	282 1.7	+0.53797
10	0.53788	1.03282	9.52478	9.97419	284 31.7	0.53797
20	0.44593	1.06397	9.52474	9.97419	287 1.7	0.53797
30	0.35397	1.09513	9.52471	9.97419	289 31.6	0.53797
40	0.26202	1.12629	9.52468	9.97420	292 1.6	0.53796
50	0.17007	1.15746	9.52465	9.97420	294 31.6	0.53796
20 0	−0.07812	+1.18863	−9.52461	+9.97421	297 1.6	+0.53796
10	+0.01382	1.21980	9.52458	9.97421	299 31.6	0.53795
20	0.10577	1.25098	9.52455	9.97421	302 1.6	0.53795
30	0.19771	1.28216	9.52451	9.97422	304 31.6	0.53794
40	0.28964	1.31335	9.52448	9.97422	307 1.6	0.53793
50	0.38158	1.34454	9.52445	9.97423	309 31.5	0.53792
21 0	+0.47351	+1.37573	−9.52442	+9.97423	312 1.5	+0.53791
10	0.56544	1.40693	9.52438	9.97423	314 31.5	0.53791
20	+0.65737	+1.43813	−9.52435	+9.97424	317 1.5	+0.53790

Greenwich Mean Time.	Log <i>z</i> ' for 1 Minute.	Log <i>y</i> ' for 1 Minute.	Log <i>μ</i> ' for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
<div>h m</div>				
17 0	+7.9635	+7.4925	+1.1761	+7.67665
18 0	7.9636	7.4930	1.1761	7.67665
19 0	7.9636	7.4934	1.1761	7.67665
20 0	7.9635	7.4938	1.1761	7.67665
21 0	7.9635	7.4941	1.1761	7.67664
22 0	+7.9633	+7.4943	+1.1761	+7.67664



# PARTIAL ECLIPSE O

## PARTIAL ECLIPSE O

*Note:- The hours of beginning and end*

**JANUARY 22<sup>nd</sup> 1917**

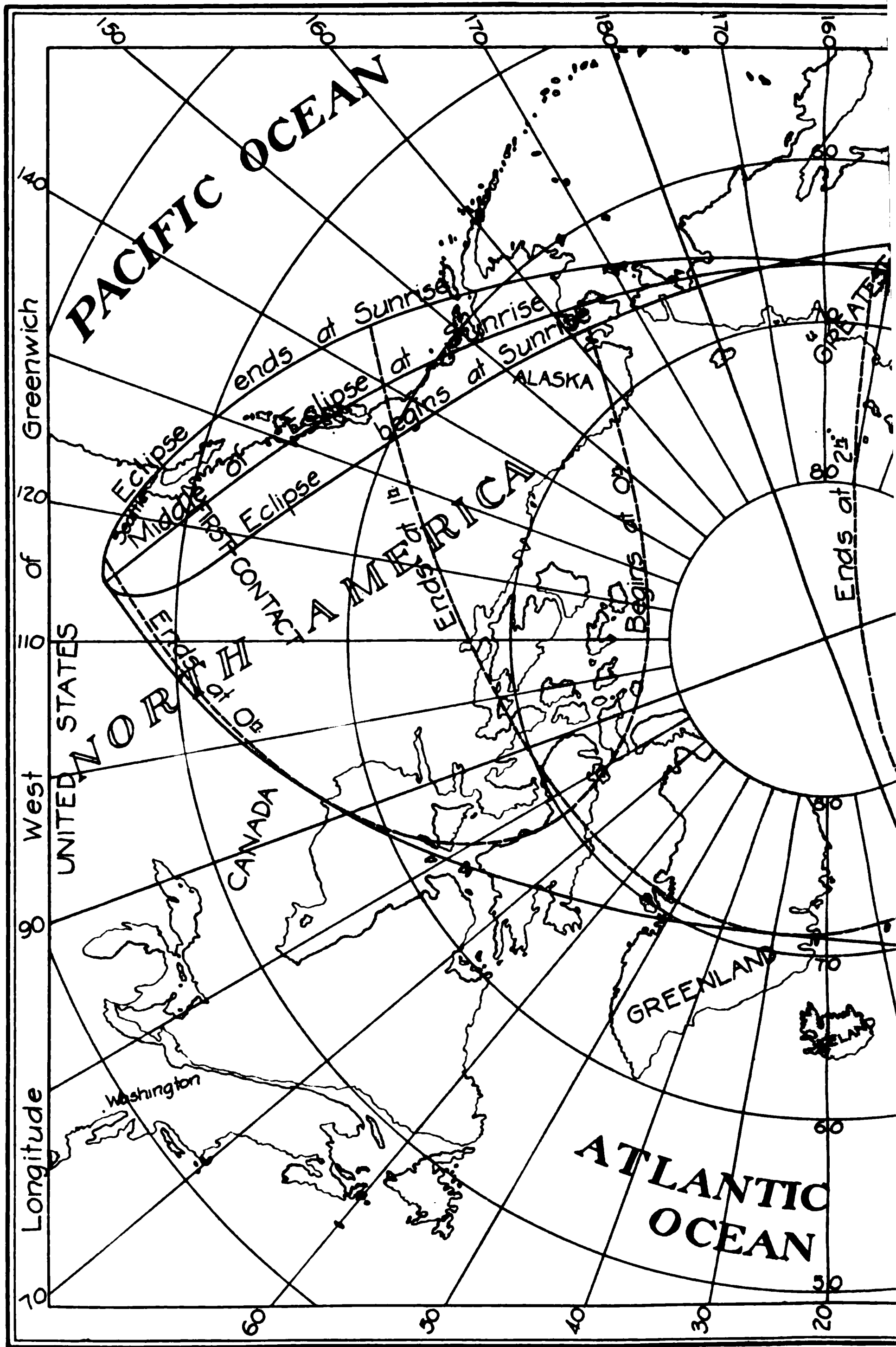
*ding are expressed in Greenwich Mean Time*







# PARTIAL ECLIPSE



*Note: The hours of beginning and ending*

OF JUNE 18<sup>th</sup> 19<sup>th</sup> 1917.

*are expressed in Greenwich Mean Time.*



BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JUNE 18-19.

562

ECLIPSES, 1917.

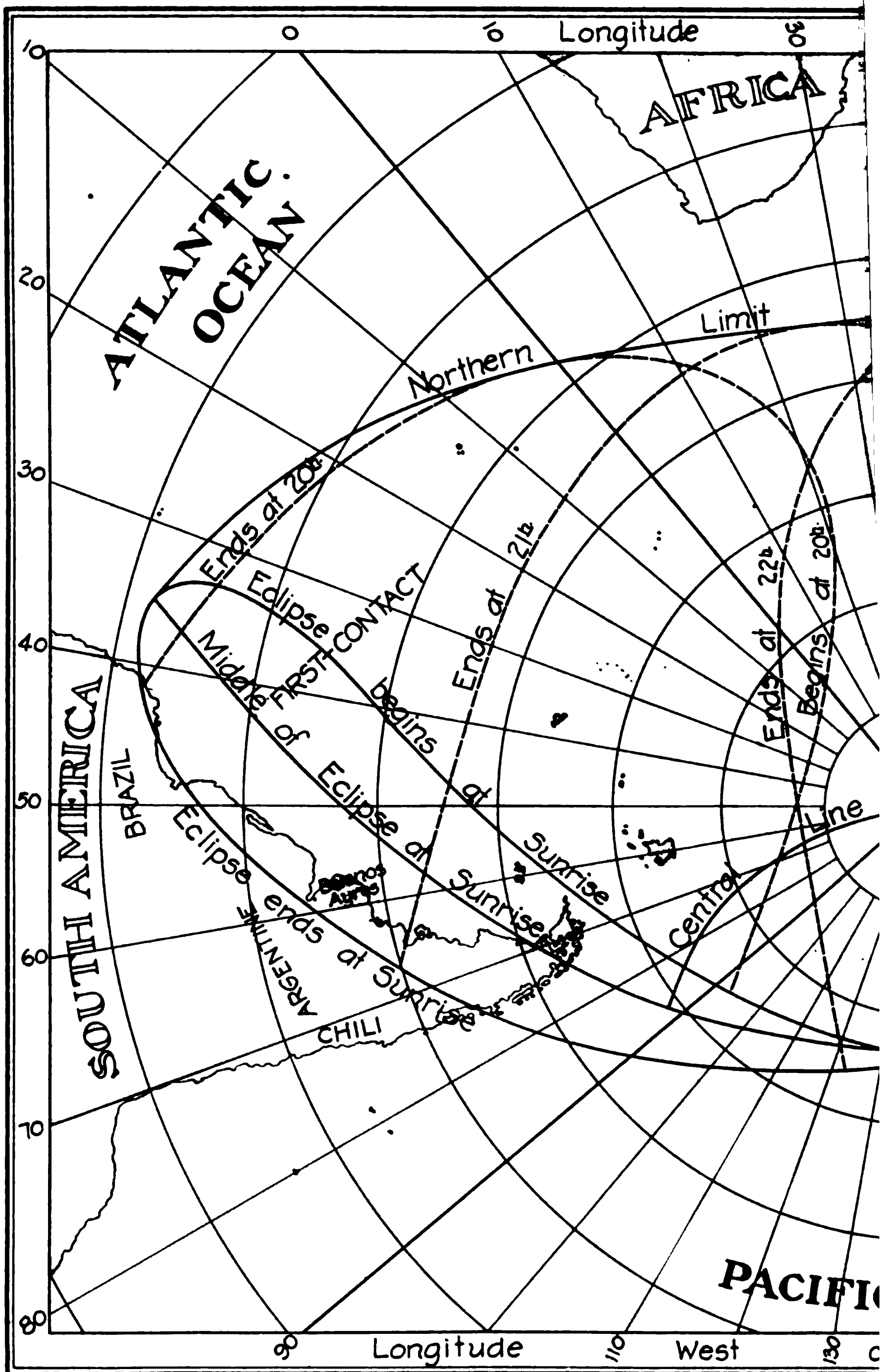
BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JULY 18.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
h m					• ' ,	
13 50	−0.85266	−1.32437	+9.55426	+9.97016	205 59.5	+0.56250
14 0	−0.77088	−1.34822	+9.55423	+9.97017	208 29.5	+0.56251
10	0.68911	1.37206	9.55421	9.97017	210 59.6	0.56253
20	0.60734	1.39591	9.55419	9.97017	213 29.6	0.56254
30	0.52556	1.41977	9.55416	9.97018	215 59.6	0.56255
40	0.44379	1.44362	9.55414	9.97018	218 29.6	0.56256
50	0.36202	1.46748	9.55412	9.97018	220 59.6	0.56257
15 0	−0.28025	−1.49135	+9.55409	+9.97019	223 29.6	+0.56258
10	0.19849	1.51522	9.55407	9.97019	225 59.6	0.56259
20	0.11672	1.53909	9.55405	9.97019	228 29.6	0.56260
30	−0.03496	−1.56297	+9.55402	+9.97020	230 59.6	+0.56261

Greenwich Mean Time.	Log <i>r</i> ' for 1 Minute.	Log <i>y</i> ' for 1 Minute.	Log <i>μ</i> ' for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
h m				
13 0	+7.9126	−7.3769	+1.1761	+7.66292
14 0	7.9126	7.3774	1.1761	7.66292
15 0	7.9126	7.3778	1.1761	7.66292
16 0	+7.9125	−7.3782	+1.1761	+7.66292

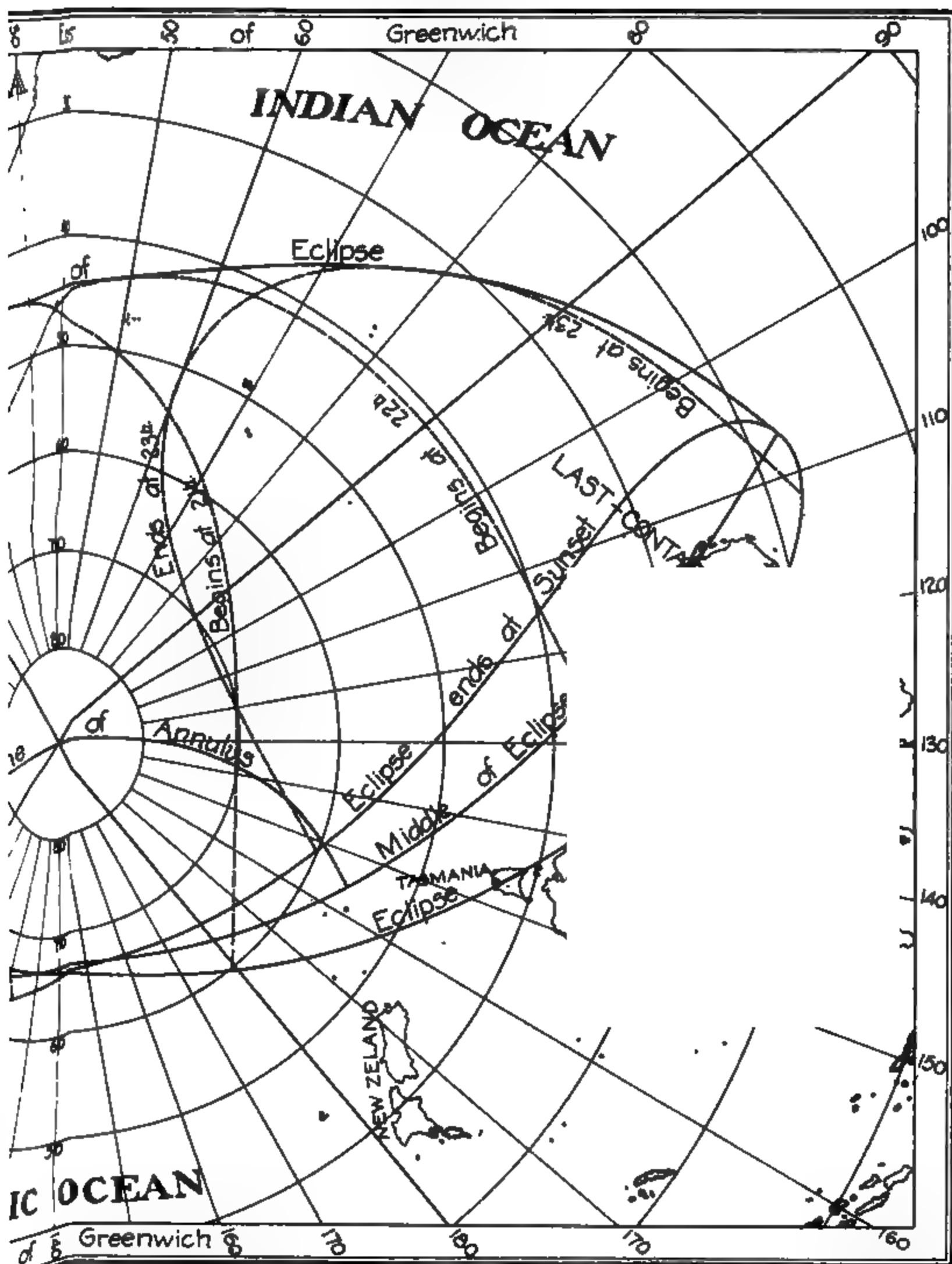


# ANNULAR ECLIPSE



Note:- The hours of beginning and

# ECLIPSE OF DECEMBER 13<sup>th</sup> 1917



and ending are expressed in Greenwich Mean Time.

ENGRAVED AND PRINTED BY THE METEOROLOGICAL SURVEY





BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF THE SUN,  
1917, 13.

2000

52

28

29

# 564 STARS OCCULTED BY THE MOON, 1917.

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

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36  
 d  
 136 B.  
 58  
 75  
  
 7  
 101  
 105  
 3  
 4  
  
 3  
 35 B.  
 47 B.  
 20 H<sup>1</sup>  
 15  
  
 6  
 26  
 μ  
 47  
 4  
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 ζ  
 τ  
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 65  
 66  
  
 7  
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 20  
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 23  
 7  
  
 104 B.  
 27  
 23  
 133 B.  
 82  
  
 33  
 161 B.  
 36  
 192 B.  
 λ  
  
 C2  
 v  
 72  
 284 B.  
 r  
  
 95

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	°	'	"	"
300 B.	Tauri	6.2	4	40	41.687	+0.0006	+23	28	36.43	+0.004
315 B.	Tauri	6.3	4	51	12.205	-0.0001	24	27	37.89	-0.033
99	Tauri	6.0	4	52	46.381	+0.0003	23	49	11.34	-0.035
<i>k</i>	Tauri	5.6	4	53	4.532	+0.0023	24	55	23.31	-0.061
103	Tauri	5.5	5	3	3.077	+0.0003	24	9	22.94	-0.021
118	Tauri	5.4	5	24	9.974	+0.0015	+25	5	3.37	-0.038
121	Tauri	5.1	5	30	22.901	+0.0010	23	59	7.42	-0.031
125	Tauri	5.1	5	34	35.552	+0.0018	25	51	5.78	-0.029
394 B.	Tauri	6.0	5	38	17.090	+0.0011	23	9	56.91	-0.042
132	Tauri	5.0	5	43	55.306	0.0000	24	32	26.80	-0.023
412 B.	Tauri	5.8	5	51	51.154	.....	+24	14	18.91	.....
139	Tauri	4.7	5	52	50.641	0.0000	25	56	40.93	-0.007
1	Geminorum	4.3	5	59	4.505	+0.0002	23	16	7.83	-0.109
3	Geminorum	5.6	6	4	41.651	+0.0014	23	7	41.32	+0.001
5	Geminorum	5.9	6	6	26.941	+0.0011	24	26	22.44	-0.061
6	Geminorum	6.3	6	7	17.244	+0.0007	+22	55	41.85	-0.013
<i>η</i>	Geminorum ( <i>var.</i> )	3.2	6	9	52.098	-0.0038	22	31	54.92	-0.016
8	Geminorum	6.1	6	11	14.787	-0.0009	23	59	52.01	-0.026
9	Geminorum	6.2	6	11	54.920	+0.0004	23	46	12.13	-0.006
<i>μ</i>	Geminorum	3.2	6	17	56.386	+0.0046	22	33	26.30	-0.114
36 B.	Geminorum	6.0	6	20	30.284	-0.0004	+23	22	27.44	+0.015
52 B.	Geminorum	6.5	6	32	21.972	-0.0021	24	39	38.50	-0.002
<i>ε</i>	Geminorum	3.2	6	38	49.590	-0.0001	25	12	51.95	-0.018
<i>d</i>	Geminorum	5.2	6	46	34.693	+0.0003	21	51	36.19	-0.045
87 B.	Geminorum	5.8	6	46	57.780	-0.0006	23	42	2.93	-0.021
<i>ω</i>	Geminorum	5.2	6	57	21.435	-0.0003	+24	20	5.47	0.000
<i>ζ</i>	Geminorum ( <i>var.</i> )	3.7	6	59	11.248	-0.0002	20	41	35.05	-0.007
44	Geminorum	5.9	7	0	18.650	0.0000	22	45	45.91	-0.020
120 B.	Geminorum	6.5	7	5	11.403	-0.0062	21	23	33.90	-0.448
<i>δ</i>	Geminorum	3.5	7	15	10.085	-0.0010	22	8	10.35	-0.015
56	Geminorum	5.2	7	17	3.070	-0.0044	+20	36	4.88	-0.025
58	Geminorum	6.0	7	18	28.960	-0.0022	23	6	21.33	-0.064
149 B.	Geminorum	6.4	7	21	56.062	-0.0219	21	42	9.15	-0.022
61	Geminorum	5.8	7	22	2.878	-0.0002	20	25	27.48	-0.023
63	Geminorum	5.3	7	22	48.886	-0.0035	21	36	58.09	-0.110
79	Geminorum	6.3	7	40	17.070	-0.0013	+20	30	58.44	-0.012
<i>g</i>	Geminorum	5.0	7	41	19.247	-0.0048	18	42	48.58	-0.063
209 B.	Geminorum	6.2	7	47	27.258	-0.0029	19	32	18.85	-0.030
85	Geminorum	5.2	7	50	49.393	-0.0011	20	6	14.43	-0.043
217 B.	Geminorum	6.3	7	55	57.875	-0.0018	20	2	40.83	-0.007
3	Cancrī	5.7	7	56	2.077	-0.0001	+17	32	13.11	-0.010
10 H.	Cancrī	6.1	7	59	57.582	-0.0020	19	4	38.61	-0.046
<i>ζ</i>	Cancrī ( <i>mean</i> )	4.7	8	7	27.241	+0.0061	17	53	56.75	-0.129
<i>d</i> <sup>1</sup>	Cancrī	5.9	8	18	36.816	-0.0038	18	35	58.31	-0.031
<i>d</i> <sup>2</sup>	Cancrī	6.2	8	21	8.140	-0.0132	17	19	14.35	-0.153
<i>θ</i>	Cancrī	5.5	8	26	51.941	-0.0039	+18	22	32.20	-0.068
90 B.	Cancrī	6.3	8	31	28.571	+0.0006	15	36	5.07	-0.027
54	Cancrī	6.3	8	46	24.249	-0.0075	15	39	33.47	+0.076
<i>o</i> <sup>1</sup>	Cancrī	5.1	8	52	37.325	+0.0041	15	38	30.60	+0.022
<i>o</i> <sup>2</sup>	Cancrī	5.7	8	52	57.216	+0.0043	15	54	2.86	+0.023
209 B.	Cancrī	6.5	9	5	15.952	-0.0008	+11	54	11.11	-0.079

**566 STARS OCCULTED BY THE MOON, 1917.**

**MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)**

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
		h m s	s	° ' "	"
40 B. Scorpii . . .	5.4	15 53 35.970	-0.0031	-24 35 33.59	+0.004
δ Scorpii . . .	2.5	15 55 25.331	-0.0012	22 23 11.19	-0.035
48 B. Scorpii . . .	4.9	15 58 19.493	-0.0048	25 38 5.25	-0.043
50 B. Scorpii . . .	6.4	15 58 55.524	+0.0017	24 29 53.90	-0.032
57 B. Scorpii . . .	5.7	16 1 9.190	-0.0011	23 22 50.27	-0.005
24 G. Scorpii . . .	6.2	16 2 52.845	0.0000	-24 14 27.16	-0.068
27 G. Scorpii . . .	5.8	16 3 46.260	+0.0032	23 27 52.47	-0.012
41 G. Scorpii . . .	6.3	16 8 45.844	-0.0004	24 12 38.64	-0.034
85 B. Scorpii . . .	6.0	16 9 51.473	-0.0005	25 16 1.31	+0.012
19 Scorpii . . .	4.9	16 15 38.310	-0.0012	23 58 12.35	-0.013
σ Scorpii . . .	3.1	16 16 8.421	-0.0011	-25 23 40.82	-0.039
ρ Ophiuchi . . .	4.7	16 20 36.261	-0.0015	23 15 22.79	-0.008
α Scorpii ( <i>Antares</i> ) . . .	1.2	16 24 18.923	-0.0006	26 14 55.76	-0.028
22 Scorpii . . .	4.8	16 25 9.754	-0.0004	24 55 59.86	-0.016
116 B. Scorpii . . .	6.2	16 26 17.073	-0.0013	26 21 28.40	-0.037
126 B. Scorpii . . .	6.1	16 36 34.259	-0.0024	-24 18 28.39	-0.004
24 Ophiuchi . . .	5.5	16 51 47.594	+0.0002	23 1 10.92	-0.034
88 B. Ophiuchi . . .	6.3	16 54 52.692	+0.0005	24 58 1.46	-0.015
26 Ophiuchi . . .	5.8	16 55 4.318	+0.0036	24 51 47.95	-0.053
118 B. Ophiuchi . . .	6.2	17 1 44.501	-0.0008	26 24 6.72	-0.046
137 B. Ophiuchi . . .	6.3	17 7 7.937	+0.0058	-25 9 12.73	-0.045
36 Ophiuchi ( <i>First Star</i> ) . . .	5.4	17 10 14.447	-0.0369	26 28 55.83	-1.169
39 Ophiuchi . . .	5.1	17 12 56.852	-0.0046	24 11 51.01	-0.011
θ Ophiuchi . . .	3.4	17 16 54.620	-0.0006	24 55 4.13	-0.036
191 B. Ophiuchi . . .	6.3	17 20 1.734	+0.0010	24 10 7.19	+0.017
b Ophiuchi . . .	4.3	17 21 17.948	-0.0009	-24 6 0.68	-0.137
136 G. Ophiuchi . . .	6.3	17 21 47.060	-0.0010	25 52 15.11	-0.003
51 Ophiuchi . . .	4.8	17 26 21.022	0.0000	23 53 58.09	-0.030
151 G. Ophiuchi . . .	6.0	17 26 35.150	+0.0012	26 12 25.23	-0.026
63 Ophiuchi . . .	6.1	17 49 47.596	-0.0001	24 52 17.96	-0.015
4 Sagittarii . . .	4.8	17 54 43.475	+0.0001	-23 48 34.52	-0.058
21 G. Sagittarii . . .	5.7	17 56 52.623	-0.0013	22 46 45.50	-0.044
7 Sagittarii . . .	5.5	17 57 45.883	-0.0003	24 16 57.22	-0.007
9 Sagittarii . . .	6.0	17 58 47.035	-0.0006	24 21 48.31	-0.006
1 Sagittarii . . .	5.2	18 6 39.480	+0.0018	23 43 9.19	-0.042
67 B. Sagittarii . . .	6.4	18 13 33.366	-0.0044	-25 38 12.95	-0.062
70 B. Sagittarii . . .	6.4	18 16 24.841	+0.0014	24 57 12.94	-0.001
λ Sagittarii . . .	2.9	18 22 50.911	-0.0033	25 28 7.64	-0.199
24 Sagittarii . . .	5.7	18 28 49.279	-0.0002	24 5 43.14	-0.020
117 B. Sagittarii . . .	5.8	18 33 27.791	-0.0015	23 34 36.15	-0.020
26 Sagittarii . . .	6.1	18 36 47.917	+0.0021	-23 54 42.11	-0.023
126 B. Sagittarii . . .	5.7	18 39 43.447	-0.0008	25 5 43.64	-0.041
28 Sagittarii . . .	5.6	18 41 20.326	+0.0018	22 28 47.72	+0.010
30 Sagittarii . . .	6.2	18 45 51.080	-0.0041	22 15 28.83	-0.024
33 Sagittarii . . .	5.8	18 49 2.466	-0.0008	21 27 44.46	-0.015
ν <sup>1</sup> Sagittarii . . .	5.0	18 49 9.568	+0.0001	-22 50 53.04	-0.022
ν <sup>2</sup> Sagittarii . . .	5.1	18 50 6.114	+0.0069	22 46 33.42	-0.024
154 B. Sagittarii . . .	5.9	18 50 59.155	-0.0010	23 16 49.94	-0.021
36 Sagittarii . . .	5.1	18 52 24.529	-0.0010	20 45 57.13	-0.011
ξ Sagittarii . . .	3.7	18 52 46.722	+0.0023	-21 13 0.46	-0.023

568      STARS OCCULTED BY THE MOON, 1917.  
MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.





## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

Time		Name.
31 B.	Scorpii	
32 B.	Scorpii	
3	Scorpii	
40 B.	Scorpii	
48 B.	Scorpii	
50 B.	Scorpii	
57 B.	Scorpii	
24 G.	Scorpii	
27 G.	Scorpii	
41 G.	Scorpii	
85 B.	Scorpii	
19	Scorpii	
$\sigma$	Scorpii	
$\alpha$	Scorpii	
22	Scorpii	
116 B.	Scorpii	
126 B.	Scorpii	
88 B.	Ophiuchi	
26	Ophiuchi	
118 B.	Ophiuchi	
137 B.	Ophiuchi	
36	Ophi. (1st star)	
0	Ophiuchi	
136 G.	Ophiuchi	
151 G.	Ophiuchi	
63	Ophiuchi	
7	Sagittarii	
9	Sagittarii	
$\rho$	Aquarii	
170 B.	Aquarii	
51	Aquarii	
186 B.	Aquarii	
$\kappa$	Aquarii	
207 B.	Aquarii	
6 G.	Pisium	
22 B.	Pisium	
$\kappa$	Pisium	
9	Pisium	
16	Pisium	
19	Pisium	
36	Pisium	
$d$	Pisium	
136 B.	Pisium	
58	Pisium	
75	Pisium	
$\eta$	Pisium	
101	Pisium	
105	Pisium	
3	Arietis	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

FEBRUARY.

52

12

12

ELEMENTS FOR THE

OF OCCULTATIONS.

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ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.
Name.	Mag.	Red'ns from 1917.0		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle. H	Y	r	y	N. S.
		$\Delta\alpha$	$\Delta\delta$							
<hr/>										
40 B. Scorpii	5.4	-1.54	-5.8	24 35.7	14 23 51.9	5 37.9	-0.3825	0.5751	-0.0867	+44 -20
50 B. Scorpii	6.4	1.52	5.7	24 30.0	15 2 3.0	7 44.0	-0.1007	0.5767	0.0813	+27 -36
57 B. Scorpii	5.7	1.50	6.0	23 22.9	2 57.6	8 36.6	-1.1300	0.5774	0.0790	-45 -90
24 G. Scorpii	6.2	1.50	5.7	24 14.5	3 39.9	9 17.3	-0.2939	0.5779	0.0772	+ 6 -60
27 G. Scorpii	5.8	1.49	5.9	23 28.0	4 1.6	9 38.2	-1.1252	0.5781	0.0763	-45 -90
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41 G. Scorpii	6.3	-1.47	-5.6	24 12.7	6 3.3	11 35.2	-0.5019	0.5795	-0.0712	- 5 -75
85 B. Scorpii	6.0	1.47	5.2	25 10.1	6 29.9	11 59.2	-0.5587	0.5799	0.0700	-53 -10
19 Scorpii	4.9	1.44	5.5	23 58.3	8 49.9	9 44.7	-0.9370	0.5814	0.0640	-31 -90
6 Scorpii	3.1	1.44	4.9	25 23.8	9 2.0	9 33.0	-0.5203	0.5816	0.0635	-50 -12
2 Scorpii	1.2	1.41	4.4	26 15.0	12 18.7	6 23.9	-1.2051	0.5837	0.0548	-64 +41
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22 Scorpii	4.8	-1.40	-4.9	24 56.1	12 39.0	6 4.4	-0.1680	0.5839	-0.0539	-10 -52
116 B. Scorpii	6.2	1.41	4.4	26 21.5	13 5.8	5 38.6	-1.2745	0.5842	0.0527	-64 +59
126 B. Scorpii	6.1	1.34	4.8	24 18.6	17 10.9	1 43.2	-1.0282	0.5877	0.0417	-40 -90
88 B. Ophiuchi	6.3	1.26	4.2	24 58.1	16 0 22.5	5 11.3	-0.5754	0.5906	0.0216	-14 -83
26 Ophiuchi	5.8	1.26	4.2	24 51.9	0 27.0	5 15.6	-0.6830	0.5906	0.0214	-20 -90
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118 B. Ophiuchi	6.2	-1.24	-3.5	26 24.2	3 2.9	7 45.2	-0.8420	0.5919	-0.0140	-64 + 8
137 B. Ophiuchi	6.3	1.21	3.8	25 9.3	5 8.5	9 45.7	-0.4544	0.5929	0.0080	- 9 -72
36 Ophi. 1st star	5.4	1.20	3.4	26 29.0	6 20.7	10 55.0	-0.8914	0.5934	-0.0046	-63 -12
6 Ophiuchi	3.4	1.16	3.7	24 55.1	8 55.3	10 36.5	-0.7028	0.5944	-0.0029	-23 -90
136 G. Ophiuchi	6.3	1.15	3.2	25 52.3	10 47.9	8 48.5	-0.2764	0.5951	0.0084	-30 -26
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151 G. Ophiuchi	6.0	-1.13	-3.0	26 12.5	12 36.6	7 2.3	-0.6275	0.5957	-0.0138	-56 - 5
63 Ophiuchi	6.1	1.02	2.9	24 52.3	21 31.2	1 28.5	-0.4759	0.5980	0.0399	- 7 -74
7 Sagittarii	5.5	0.98	2.9	24 17.0	17 0 33.4	4 23.3	-0.9339	0.5966	0.0489	-33 -90
9 Sagittarii	6.0	0.98	2.9	24 21.9	0 38.7	4 45.7	-0.8330	0.5988	0.0500	-26 -90
67 B. Sagittarii	6.4	0.93	2.2	25 36.3	6 33.7	10 8.8	-0.7749	0.5991	0.0666	-64 + 4
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70 B. Sagittarii	6.4	-0.91	-1.5	24 57.3	7 38.9	11 11.4	-0.1626	0.5992	-0.0697	-29 -32
1 Sagittarii	2.3	0.86	2.1	25 28.2	10 5.7	10 28.0	-0.8578	0.5993	0.0769	-65 + 9
24 Sagittarii	5.7	0.83	2.3	24 5.9	12 21.9	9 17.4	-0.8376	0.5992	0.0834	- 4 -62
117 B. Sagittarii	5.8	0.83	2.3	23 34.6	14 7.7	7 35.9	-0.7323	0.5992	0.0886	-15 -90
28 Sagittarii	6.1	0.82	2.2	23 54.7	15 23.6	5 23.9	-0.2520	0.5991	0.0922	+ 9 -57
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126 B. Sagittarii	5.7	-0.82	-1.6	25 5.8	16 30.6	4 16.8	-1.0635	0.5990	-0.0954	+65 +22
11 Sagittarii	5.0	0.77	2.2	23 30.9	20 6.2	0 32.2	-1.0473	0.5988	0.1055	-23 -80
11 Sagittarii	5.1	0.75	2.2	23 49.8	20 27.7	0 31.4	-1.0809	0.5985	0.1065	-24 -90
154 B. Sagittarii	5.9	0.73	2.0	23 15.9	20 47.6	0 12.1	-0.9425	0.5985	0.1075	+ 6 -63
168 B. Sagittarii	6.6	0.73	2.1	23 49.9	22 57.1	1 51.9	-0.5891	0.5981	0.1135	- 6 -81
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191 B. Sagittarii	6.5	-0.72	-1.6	23 19.4	18 1 32.9	4 28.0	-0.2535	0.5976	-0.1210	+39 -27
199 B. Sagittarii	6.4	0.70	2.1	21 47.9	3 6.7	5 51.2	-1.0917	0.5972	0.1249	-37 -90
222 B. Sagittarii	6.5	0.68	1.7	21 33.5	6 14.4	8 51.2	-0.0781	0.5963	0.1333	+30 -37
30 Sagittarii	5.6	0.65	1.6	21 58.8	8 28.1	10 57.0	-0.2338	0.5976	0.1391	+15 -55
253 B. Sagittarii	6.1	0.64	1.6	21 12.1	10 12.6	11 20.2	-0.4344	0.5953	0.1437	+ 5 -69
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7 Sagittarii	5.1	-0.58	-1.6	19 57.7	16 13.7	5 33.6	-1.0283	0.5933	-0.1588	-29 -90
6 Sagittarii	5.5	0.49	-1.6	19 22.7	19 5 12.4	6 54.0	-0.6596	0.5878	0.1887	+69 - 6
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NEW MOON.										
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36 Piscium	6.1	-0.38	-4.1	7 49.3	23 11 2.6	9 5.0	-0.9921	0.5513	-0.2535	-13 -82
6 Piscium	5.4	-0.45	-4.1	7 43.6	12 11.1	10 48.1	-0.4543	0.5512	-0.2521	-16 -69
136 B. Piscium	6.5	0.43	4.7	8 59.1	12 7.4	4 14.7	-0.2683	0.5511	0.2432	-64 - 6
75 Piscium	6.3	0.42	6.0	12 30.9	24 9 30.1	6 44.7	-0.2156	0.5516	0.2286	-24 -55
7 Piscium	3.7	0.35	5.8	14 55.2	27 38.7	7 29.8	-0.2331	0.5526	0.2140	+26 -52
101 Piscium	6.2	0.37	5.7	14 14.4	12 36.9	4 36.5	-0.5110	0.5528	0.2110	+90 + 8
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105 Piscium	6.1	-0.62	-7.2	15 32.2	25 1 17.5	2 56.8	-0.5182	0.5520	-0.2083	+ 8 -70

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

## MARCH.

118	Tauri	5.4	+2.15	+5.7	+25	5.2	1	4 50.7	-	1 57.8	+0.4652	0.5539
125	Tauri	5.1	2.22	5.4	25	51.2		9 29.0	+	2 30.9	-0.4434	0.5526
132	Tauri	5.0	2.26	4.5	24	32.5		13 39.2	+	6 32.9	+0.8818	0.5513
412 B.	Tauri	5.8	2.90	4.0	24	14.4		17 12.9	+	9 58.7	+1.0909	0.5502
139	Tauri	4.7	2.34	4.5	25	56.8		17 39.7	+	10 24.6	-0.7947	0.5500
5	Geminorum	5.9	+2.39	+3.2	+24	26.4		23 48.7	-	7 39.0	+0.5693	0.5478
8	Geminorum	6.1	2.41	2.8	23	59.9	2	1 59.6	-	5 32.6	+0.9333	0.5470
9	Geminorum	6.2	2.41	2.7	23	46.2		2 17.9	-	5 14.9	+1.1658	0.5469
52 B.	Geminorum	6.5	2.54	1.7	24	39.7		11 41.0	+	3 49.9	-0.4590	0.5432
87 B.	Geminorum	6.6	2.59	+0.5	23	42.1		18 28.2	+	10 23.0	+0.0169	0.5402
ω	Geminorum	5.2	+2.65	0.0	+24	20.1		23 21.0	-	8 53.8	-1.1599	0.5380
44	Geminorum	6.6	2.64	-0.6	22	45.8	3	0 44.7	-	7 32.8	+0.4925	0.5374
δ	Geminorum	3.5	2.71	1.8	22	8.1		7 48.7	-	0 42.4	+0.3361	0.5343
μ	Geminorum	6.0	2.72	1.8	23	6.3		9 24.1	+	0 49.9	-0.9278	0.5334
149 B.	Geminorum	6.4	2.71	2.4	21	42.1		11 3.6	+	2 26.2	+0.4221	0.5326
63	Geminorum	6.6	+2.72	-2.4	+21	36.9		11 29.1	+	2 50.9	+0.4849	0.5324

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

25

26

27

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
MARCH.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

APRIL.



**ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.**

**APRIL.**

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

## MAY.

HH	Sextantis	6.1	+2.58	-15.7	+ 5 10.8	1	9	5.6	+ 1 3.4
p <sup>3</sup>	Leonis	6.1	2.64	17.7	0 26.5	20	15.9	+11 55.2	
p <sup>4</sup>	Leonis	5.7	2.66	17.3	2 24.1	22	4.8	-10 18.9	
p <sup>4</sup>	Leonis	5.3	+2.69	-18.0	+ 0 22.6	2	1 49.7	- 6 40.3	
388 B.	Leonis	6.3	2.74	18.8	- 1 14.9	9	32.8	+ 0 50.0	
e	Leonis	5.1	2.75	19.1	2 33.0	10	51.8	+ 2 6.8	
431 B.	Leonis	6.2	2.79	19.1	1 58.9	15	14.9	+ 6 22.5	
13 B.	Virginis	5.9	2.83	20.0	4 52.6	22	3.4	-11 0.5	
64 B.	Virginis	6.5	+2.91	-20.6	- 7 19.1	3	8 23.3	- 0 58.2	
q	Virginis	5.3	3.02	20.9	9 00.0	20	33.8	+10 51.0	
370 B.	Virginis	6.0	3.10	21.1	11 12.3	4	7 2.0	- 2 59.6	
75	Virginis	5.6	3.27	20.6	14 56.5	5	1 59.4	- 8 37.7	
83	Virginis	5.6	3.32	20.4	15 46.1	7	31.8	- 3 16.0	
85	Virginis	6.1	+3.32	-20.3	-15 21.4	8	3.0	- 2 45.8	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		Δα	Δδ		d h m	h m					
43 H. Virginis	5.5	+3.44	-19.2	-17 49.2	5 21 51.3	+10 35.1	-0.3055	0.5505	-0.1739	+16	-59
231 G. Virginis	6.4	3.45	19.2	18 12.3	22 36.3	+11 18.6	-0.0279	0.5510	0.1727	+30	-42
236 G. Virginis	5.7	3.46	19.1	18 20.2	23 19.2	+12 0.0	-0.0120	0.5516	0.1716	+31	-42
9 G. Libræ	6.5	3.53	18.4	20 4.8	6 6 34.0	- 5 0.0	+0.6237	0.5572	0.1594	+66	- 5
17 G. Libræ	6.4	3.57	17.8	20 49.8	11 33.4	- 0 11.1	+0.6357	0.5611	0.1504	+66	- 5
18 G. Libræ	6.1	+3.57	-17.7	-20 58.9	12 0.7	+ 0 15.2	+0.7277	0.5614	-0.1495	+69	0
43 B. Libræ	5.7	3.62	17.7	21 2.8	16 25.0	+ 4 30.1	+0.1549	0.5648	0.1410	+36	-32
47 G. Libræ	6.1	3.63	16.5	21 42.8	20 18.8	+ 8 15.5	+0.3179	0.5676	0.1332	+44	-23
64 G. Libræ	5.8	3.65	15.8	22 5.8	7 0 32.3	-11 40.2	+0.1737	0.5707	0.1243	+35	-31
169 B. Libræ	6.0	3.69	14.3	22 52.3	9 29.7	- 3 2.7	-0.0451	0.5767	0.1042	+22	-44
177 B. Libræ	6.2	+3.70	-14.2	-22 53.0	10 8.4	- 2 25.4	-0.0987	0.5771	-0.1027	+19	-47
42 Libræ	5.0	3.71	14.0	23 33.2	10 30.8	- 2 3.9	+0.5592	0.5774	0.1018	+56	- 9
31 B. Scorpïi	5.4	3.74	13.0	24 17.4	16 5.9	+ 3 18.5	+0.7917	0.5808	0.0884	+66	+ 5
32 B. Scorpïi	5.3	3.73	13.0	23 44.1	16 7.2	+ 3 19.8	+0.2139	0.5808	0.0884	+34	-29
40 B. Scorpïi	5.4	3.75	12.6	24 35.8	18 0.3	+ 5 8.6	+0.9441	0.5818	0.0838	+65	+16
50 B. Scorpïi	6.4	+3.75	-12.2	-24 30.1	20 10.3	+ 7 13.6	+0.6698	0.5830	-0.0783	+62	- 3
57 B. Scorpïi	5.7	3.72	12.1	23 23.0	21 4.6	+ 8 5.9	-0.5573	0.5835	0.0760	- 8	-80
24 G. Scorpïi	6.2	3.74	11.9	24 14.6	21 46.6	+ 8 46.3	+0.2805	0.5838	0.0743	+36	-25
27 G. Scorpïi	5.8	3.73	11.9	23 28.1	22 8.2	+ 9 7.0	-0.5495	0.5840	0.0734	- 8	-79
41 G. Scorpïi	6.3	3.74	11.4	24 12.8	8 0 9.2	+11 3.4	+0.0796	0.5850	0.0682	+25	-36
85 B. Scorpïi	6.0	+3.77	-11.2	-25 16.2	0 35.7	+11 28.9	+1.1419	0.5853	-0.0671	+65	+34
19 Scorpïi	4.9	3.74	10.9	23 58.4	2 55.2	-10 17.0	-0.3479	0.5863	0.0610	+ 2	-63
σ Scorpïi	3.1	3.78	10.7	25 23.9	3 7.3	-10 5.4	+1.1116	0.5864	0.0605	+65	+30
ρ Ophiuchi	4.7	3.72	10.6	23 15.6	4 54.6	- 8 22.3	-1.2011	0.5872	0.0558	-54	-89
22 Scorpïi	4.8	3.76	10.0	24 56.2	6 44.0	- 6 37.1	+0.4326	0.5881	0.0510	+44	-16
126 B. Scorpïi	6.1	+3.73	- 9.1	-24 18.6	11 16.4	- 2 15.3	-0.4164	0.5897	-0.0388	- 4	-68
88 B. Ophiuchi	6.3	3.73	7.4	24 58.1	18 30.5	+ 4 41.6	+0.0525	0.5917	0.0191	+19	-38
26 Ophiuchi	5.8	3.73	7.5	24 51.9	18 35.1	+ 4 46.1	-0.0556	0.5917	0.0188	+13	-44
137 B. Ophiuchi	6.3	3.72	6.4	25 9.3	23 19.6	+ 9 19.2	+0.1841	0.5927	-0.0056	+25	-30
θ Ophiuchi	3.4	3.70	5.6	24 55.2	9 3 9.6	-11 0.0	-0.0591	0.5932	+0.0051	+12	-44
191 B. Ophiuchi	6.3	+3.67	- 5.4	-24 10.2	4 22.8	- 9 49.7	-0.8188	0.5933	+0.0085	-29	-90
b Ophiuchi	4.3	3.66	5.4	24 6.1	4 52.7	- 9 21.0	-0.8843	0.5933	0.0099	-33	-90
136 G. Ophiuchi	6.3	3.71	5.0	25 52.3	5 4.1	- 9 10.0	+0.9322	0.5934	0.0104	+64	+15
51 Ophiuchi	4.8	3.65	5.0	23 54.1	6 51.3	- 7 27.1	-1.0646	0.5935	0.0155	-45	-90
63 Ophiuchi	6.1	3.61	2.7	24 52.3	16 1.5	+ 1 21.1	+0.1892	0.5933	0.0410	+29	-30
4 Sagittarii	4.8	+3.57	- 2.5	-23 48.6	17 57.3	+ 3 12.4	-0.8116	0.5930	+0.0463	-26	-90
7 Sagittarii	5.5	3.57	2.2	24 17.0	19 8.7	+ 4 20.9	-0.2714	0.5929	0.0496	+ 5	-58
9 Sagittarii	6.0	3.57	2.1	24 21.8	19 32.6	+ 4 43.9	-0.1688	0.5928	0.0507	+10	-51
1 Sagittarii	5.2	3.53	1.5	23 43.2	22 37.8	+ 7 41.7	-0.6566	0.5923	0.0592	-15	-90
70 B. Sagittarii	6.4	3.53	- 0.4	24 57.2	10 2 27.8	+11 22.6	+0.8489	0.5915	0.0696	+65	+ 9
24 Sagittarii	5.7	+3.46	+ 0.4	-24 5.7	7 21.1	- 7 55.7	+0.3455	0.5902	+0.0826	+41	-21
117 B. Sagittarii	5.8	3.43	0.7	23 34.6	9 11.2	- 6 9.9	-0.0267	0.5897	0.0874	+21	-42
26 Sagittarii	6.1	3.42	1.0	23 54.7	10 30.4	- 4 53.9	+0.4319	0.5892	0.0909	+47	-16
28 Sagittarii	5.6	3.37	1.0	22 28.8	12 18.4	- 3 10.1	-0.8575	0.5886	0.0956	-24	-90
30 Sagittarii	6.2	3.34	1.3	22 15.5	14 6.0	- 1 26.7	-0.9076	0.5879	0.1002	-26	-90
ν <sup>1</sup> Sagittarii	5.0	+3.34	+ 1.8	-22 50.9	15 25.0	- 0 10.8	-0.1733	0.5874	+0.1035	+14	-51
ν <sup>2</sup> Sagittarii	5.1	3.34	1.8	22 46.5	15 47.5	+ 0 10.8	-0.2076	0.5873	0.1045	+13	-53
154 B. Sagittarii	5.9	3.34	2.0	23 16.8	16 8.6	+ 0 31.2	+0.3425	0.5872	0.1053	+43	-22
168 B. Sagittarii	6.3	3.31	2.4	22 48.8	18 23.8	+ 2 41.0	+0.1107	0.5862	0.1110	+30	-35
o Sagittarii	3.9	3.27	2.3	21 51.8	19 37.8	+ 3 52.1	-0.7152	0.5857	0.1140	-13	-90
191 B. Sagittarii	6.5	+3.29	+ 3.1	-23 19.3	21 14.5	+ 5 25.1	+0.9533	0.5850	+0.1179	+67	+16

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.





## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
JUNE.

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

JULY.

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169	B.	Librae
177	B.	Librae
42		Librae
31	B.	Scorpii
32	B.	Scorpii
40	B.	Scorpii
50	B.	Scorpii
57	B.	Scorpii
24	G.	Scorpii
27	G.	Scorpii
41	G.	Scorpii
85	B.	Scorpii
19		Scorpii
6		Scorpii
$\rho$		Ophiuchi
22		Scorpii
128	B.	Scorpii
88	B.	Ophiuchi
26		Ophiuchi
137	B.	Ophiuchi
39		Ophiuchi
0		Ophiuchi
191	B.	Ophiuchi
b		Ophiuchi
136	G.	Ophiuchi
51		Ophiuchi
63		Ophiuchi
4		Sagittarii
7		Sagittarii
9		Sagittarii
1		Sagittarii
70	B.	Sagittarii
24		Sagittarii
117	B.	Sagittarii
26		Sagittarii
28		Sagittarii
30		Sagittarii
$\nu^1$		Sagittarii
$\nu^2$		Sagittarii
154	B.	Sagittarii
168	B.	Sagittarii
o		Sagittarii
191	B.	Sagittarii

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.  
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ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

1

1

8

1

1  
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1  
4

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8

8

4

8

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

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Name

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47 B. Arie

20 H<sup>1</sup>. Arie

0 Arie

26 Arie

μ Arie

47 Arie

8 Arie

5 Arie

66 Arie

16 Taur

17 Taur

9 Taur

20 Taur

III Taur

22 Taur

23 Taur

7 Taur

104 B. Taur

27 Taur

28 Taur

III Taur

161 B. Taur

IV Taur

x Taur

62 Taur

95 Taur

315 B. Taur

99 Taur

k Taur

103 Taur

118 Taur

121 Taur

125 Taur

132 Taur

412 B. Taur

1 Gem

3 Gem

5 Gem

8 Gem

9 Gem

36 B. Gem

52 B. Gem

II Gem

87 B. Gem

MAR

44 Gem

120 B. Gem

8 Gem

56 Gem

149 B. Gem

61 Gem

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

Name	
III	Gem
79	Gem
III II.	Gem
85	Gem
217 B.	Gem
10 H.	Canc
ζ	Canc
p <sup>s</sup>	Leor
388 B.	Leor
e	Leor
431 B.	Leor
13 B.	Virg
64 B.	Virg
q	Virg
370 B.	Virg
75	Virg
83	Virg
85	Virg
43 H.	Virg
231 G.	Virg
236 G.	Virg
9 G.	Libr
17 G.	Libr
18 G.	Libr
43 B.	Libr
47 G.	Libr
64 G.	Libr
169 B.	Libr
177 B.	Libr
III	Libr
31 B.	Scor
32 B.	Scor
40 B.	Scor
δ	Scor
50 B.	Scor
57 B.	Scor
24 G.	Scor
27 G.	Scor
41 G.	Scor
19	Scor
ρ	Oph
22	Scor
126 B.	Scor
88 B.	Oph
26	Oph
137 B.	Oph
39	Oph
θ	Oph
191 B.	Ophi



## ELEMENTS FOR THE PREDICTION OF OCULTATIONS.

AUGUST.

3  
 4  
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 6  
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 12  
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 17  
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 30  
 31

SEPTEMBER.

$\kappa$ Aquarii	5.2	+4.45	+25.9	- 4 39 0	1	0 19.7	-11 33.4	+0.2678	0.5669	+0.2567	+55	-26
207 B. Aquarii	6.3	4.45	26.1	3 58.7		1 38 3	-10 17.7	-0.0506	0.5667	0.2573	+37	-43
6 G. Piscium	6.2	4.42	26.8	2 50 0		9 10.4	- 3 1.9	+0.7767	0.5653	0.2593	+87	+ 1
22 B. Piscium	6.4	4.38	27.5	- 0 9.4	20	7.8	+ 7 32.1	+1.0047	0.5637	0.2593	+90	+15
<i>Piscium</i>	4.9	+4.37	+27.4	+ 0 48.5	21	36.6	+ 8 57.8	+0.4423	0.5636	+0.2590	+67	-17

## ELEMENTS FOR THE

## OF OCCULTATIONS.

Name.

9	Piscium
11	Piscium
19	Piscium
36	Piscium
d	Piscium
136 B.	Piscium
75	Piscium
$\eta$	Piscium
101	Piscium
106	Piscium
3	Arietis
4	Arietis
$\epsilon$	Arietis
35 B.	Arietis
47 B.	Arietis
20 H <sup>1</sup> .	Arietis
26	Arietis
$\mu$	Arietis
47	Arietis
$\epsilon$	Arietis
$\zeta$	Arietis
$\tau$	Arietis
66	Arietis
16	Tauri
37	Tauri
20	Tauri
23	Tauri
$\eta$	Tauri
104 B.	Tauri
27	Tauri
28	Tauri
133 B.	Tauri
32	Tauri
33	Tauri
161 B.	Tauri
36	Tauri
62	Tauri
284 B.	Tauri
95	Tauri
300 B.	Tauri
315 B.	Tauri
99	Tauri
k	Tauri
103	Tauri
118	Tauri
121	Tauri
132	Tauri
412 B.	Tauri
1	Gemino
11	Gemino
5	Gemino

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

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6	C
8	C
9	C
36 B.	C
d	C
87 B.	C
44	C
120 B.	C
8	C
56	C
149 B.	C
61	C
63	C
79	C
209 B.	C
85	C
217 B.	C
10 H.	C
6	C
d <sup>1</sup>	C
d <sup>2</sup>	C
90 B.	C
54	C
o <sup>1</sup>	C
222 B.	C
4	I
o	I
83 B.	I
89 B.	I
π	I
75	V
83	V
85	V
214 G.	V
48 H.	V
231 G.	V
236 G.	V
9 G.	I
17 G.	I
18 G.	I
43 B.	I
47 G.	I
64 G.	I
169 B.	I
177 B.	I
42	I
81 B.	E
82 B.	E
8	E

## ELEMENTS FOR THE

## OF OCULTATIONS.

50 I  
57 I  
24 C  
27 C  
41 C

19  
 $\rho$   
22  
126 I  
88 I

26  
137 I  
39  
0  
191 I

6  
51  
63  
4  
7

9  
1  
24  
117 I  
26

28  
30  
33  
 $\nu^1$   
 $\nu^2$

154 I  
 $\xi$   
168 I  
0  
 $\pi$

199 I  
222 I  
50  
253 I  
 $f$

57  
31 I  
 $\rho$   
47 I  
 $\tau$

61 I  
95 I  
53 I  
18  
72 I

137 I

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

75	Pisciu
$\eta$	Pisciu
101	Pisciu
105	Pisciu
4	Arieti
$\epsilon$	Arieti
35 B.	Arieti
47 B.	Arieti
20 H <sup>1</sup> .	Arieti
26	Arieti
$\mu$	Arieti
47	Arieti
$\epsilon$	Arieti
$\zeta$	Arieti
$\tau$	Arieti
66	Arieti
17	Tauri
23	Tauri
$\eta$	Tauri
104 B.	Tauri
27	Tauri
28	Tauri
133 B.	Tauri
32	Tauri
33	Tauri
161 B.	Tauri
36	Tauri
62	Tauri
72	Tauri
284 B.	Tauri
95	Tauri
	Tauri

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

Name.

315 B.	Tauri
99	Tauri
k	Tauri
103	Tauri
118	Tauri
121	Tauri
394 B.	Tauri
132	Tauri
412 B.	Tauri
1	Geminorum
3	Geminorum
5	Geminorum
6	Geminorum
7	Gemin. (m)
11	Geminorum
9	Geminorum
μ	Geminorum
36 B.	Geminorum
d	Geminorum
87 B.	Geminorum
44	Geminorum
120 B.	Geminorum
δ	Geminorum
56	Geminorum
149 B.	Geminorum
61	Geminorum
63	Geminorum
79	Geminorum
γ	Geminorum
209 B.	Geminorum
85	Geminorum
217 B.	Geminorum
10 H.	Canceri
ζ	Canceri (m)
d <sup>2</sup>	Canceri
90 B.	Canceri
54	Canceri
o <sup>1</sup>	Canceri
222 B.	Canceri
ξ	Leonis
λ	Leonis
o	Leonis
83 B.	Leonis
89 B.	Leonis
π	Leonis
43	Leonis
155 B.	Leonis
237 B.	Leonis
55	Leonis
ρ <sup>2</sup>	Leonis
p <sup>4</sup>	Leonis

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

Name.

388 B. Leonis  
 431 B. Leonis

47 G. Libræ  
 64 G. Libræ  
 169 B. Libræ  
 177 B. Libræ  
 42 Libræ

32 B. Scorpi  
 6 Scorpi  
 57 B. Scorpi  
 24 G. Scorpi  
 27 G. Scorpi

41 G. Scorpi  
 19 Scorpi  
 ρ Ophiu  
 22 Scorpi  
 VENTUS

126 B. Scorpi  
 24 Ophiu  
 88 B. Ophiu  
 26 Ophiu  
 137 B. Ophiu

39 Ophiu  
 6 Ophiu  
 191 B. Ophiu  
 6 Ophiu  
 51 Ophiu

63 Ophiu  
 4 Sagittæ  
 21 G. Sagittæ  
 7 Sagittæ  
 9 Sagittæ

1 Sagittæ  
 24 Sagittæ  
 117 B. Sagittæ  
 26 Sagittæ  
 28 Sagittæ

30 Sagittæ  
 33 Sagittæ  
 γ<sup>1</sup> Sagittæ  
 γ<sup>2</sup> Sagittæ  
 154 B. Sagittæ

4 Sagittæ  
 168 B. Sagittæ  
 o Sagittæ  
 π Sagittæ  
 199 B. Sagittæ  
 50 Sagittæ

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

## ELEMENTS FOR THE

## OF OCCULTATIONS.

NOVEMBER.

THE STAR'S					AT C				
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.			H	At
		$\Delta\alpha$	$\Delta\delta$						
		$\alpha$	$\delta$	$\alpha$	d	h	m	b	
$\zeta$ Cancri (mean)	4.7	+4.31	-11.8	+17 53.7	5	2	8.8	+8	
$d^3$ Cancri	6.2	4.19	13.0	17 19.0	8	54.1	-8		
90 B. Cancri	6.3	4.10	13.2	15 35.9	14	4.9	-3		
54 Cancri	6.3	3.99	14.4	15 30.3	21	40.2	+3		
209 B. Cancri	6.5	1.80	14.7	11 53.9	6	7 26.1	-10		
222 B. Cancri	6.3	+3.76	-15.2	+11 50.7	11	41.1	-6		
$\epsilon$ Leonis	5.1	3.65	16.2	11 39.8	19	10.9	+0		
$h$ Leonis	5.2	3.64	15.6	10 4.7	19	11.6	+0		
$o$ Leonis	3.8	3.57	16.3	10 16.0	7	0 7.7	+5		
83 B. Leonis	5.9	3.46	16.8	9 19.3	8	24.6	-10		
.89 B. Leonis	6.2	+3.45	-16.7	+ 8 42.4	9	20.0	-9		
$\pi$ Leonis	4.9	3.43	16.8	8 26.3	10	28.5	-8		
155 B. Leonis	6.5	3.24	17.2	6 6.7	23	8.9	+3		
237 B. Leonis	6.3	3.08	16.9	1 27.6	8	15 13.1	-4		
55 Leonis	6.1	3.07	16.9	1 10.5	17	8.7	-2		
$p^2$ Leonis	6.1	+3.02	-16.9	+ 0 26.5	21	32.6	+1		
$p^5$ Leonis	5.3	2.97	17.3	+ 0 22.6	9	3 10.5	+7		
388 B. Leonis	6.3	2.90	17.1	- 1 14.9	11	0.2	-9		
$e$ Leonis	5.1	2.89	16.8	2 33.0	12	20.4	-7		
431 B. Leonis	6.2	2.85	17.1	1 58.9	16	47.8	-3		
13 B. Virginis	6.5	+2.80	-16.6	- 4 52.6	23	43.7	+3		
64 B. Virginis	6.5	2.73	16.2	7 10.0	10	10 16.6	-10		
$q$ Virginis	5.3	2.64	16.0	8 59.9	22	44.9	+1		
370 B. Virginis	6.0	2.62	15.5	11 12.2	11	9 30.5	-11		
75 Virginis	5.4	2.55	14.4	14 56.4	12	5 4.1	+7		
NEW MOON.									
39 Ophiuchi	5.1	+3.00	- 4.0	-24 11.9	16	8 44.2	+7		
$\theta$ Ophiuchi	3.4	3.03	3.9	24 55.1	10	21.5	+8		
191 B. Ophiuchi	6.3	3.03	3.9	24 10.2	11	38.0	+9		
$\delta$ Ophiuchi	4.3	+3.03	- 3.5	-24 6.1	12	9.1	+10		
51 Ophiuchi	4.8	3.04	3.0	23 54.0	14	13.0	-11		
63 Ophiuchi	6.1	3.14	1.5	24 52.3	23	46.8	-2		
4 Sagittarii	4.8	3.13	1.0	23 48.6	17	1 47.5	-0		
21 G. Sagittarii	5.7	3.12	0.6	22 46.8	2	40.2	+0		
7 Sagittarii	5.5	+3.15	- 0.8	-24 17.0	3	1.9	+0		
9 Sagittarii	6.0	3.16	- 0.7	24 21.8	3	26.9	+1		
1 Sagittarii	5.2	3.17	0.0	23 43.2	6	39.7	+4		
117 B. Sagittarii	5.8	3.26	+ 2.1	23 34.6	17	38.2	-9		
28 Sagittarii	5.6	3.27	3.0	22 28.7	20	52.6	-6		
30 Sagittarii	5.7	+3.27	+ 3.4	-22 15.4	22	44.1	-4		
33 Sagittarii	5.8	3.27	3.8	21 27.7	18	0 3.1	-2		
$\nu^1$ Sagittarii	5.0	3.30	3.5	22 50.8	0	6.0	-2		
$\nu^2$ Sagittarii	5.1	3.31	3.6	22 46.5	0	29.4	-2		
154 B. Sagittarii	5.9	3.32	3.5	23 16.8	0	51.3	-2		
36 Sagittarii	5.1	+3.26	+ 4.3	-20 45.9	1	26.6	-1		
$\epsilon$ Sagittarii	3.7	3.28	4.2	21 12.9	1	35.7	-1		
168 B. Sagittarii	6.3	3.28	4.1	22 48.7	3	11.9	+0		
$o$ Sagittarii	3.9	3.32	4.5	21 51.8	4	27.9	+1		
$\pi$ Sagittarii	3.0	3.32	5.2	21 9.3	6	35.4	+3		
199 B. Sagittarii	6.4	+3.35	+ 5.2	-21 47.7	7	42.3	+4		



**ELEMENTS FOR THE**

**OF OCCULTATIONS.**

**DECEMBER.**

## ELEMENTS FOR THE

## OF OCCULTATIONS.

N

10 H. Ca  
 5 Ca  
 54 Ca  
 90 B. Ca  
 54 Ca

209 B. Ca  
 222 B. Ca  
 5 Le  
 5 Le  
 5 Le

83 B. Le  
 89 B. Le  
 5 Le  
 14 Se  
 155 B. Le

237 B. Le  
 55 Le  
 5 Le  
 5 Le  
 358 B. Le

5 Le  
 431 B. Le  
 13 B. Vi  
 64 B. Vi  
 5 Vi

370 B. Vi  
 75 Vi  
 83 Vi  
 85 Vi  
 214 G. Vi

43 H. Vi  
 231 G. Vi  
 236 G. Vi  
 9 G. Lil  
 17 G. Lil

18 G. Lil  
 43 B. Lil  
 47 G. Lil  
 64 G. Lil

266 B. Sa  
 57 Sa  
 57 Sa

31 B. Ca  
 27 G. Ca  
 47 B. Ca  
 5 Ca  
 61 B. Ca

25 B. Ca

## ELEMENTS FOR THE

## OF OCCULTATIONS.

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$r$
53 1
19
72 1
137 1
$c^1$
$c^2$
30
44
51
157 1
$\kappa$
207 1
6 (
3
$\kappa$
9
16
19
$\omega$
36
$d$
136 1
58
75
$\eta$
101
105
4
1
35 1
47 1
20 1
26
$\mu$
47
$e$
$\xi$
$\tau$
63
65
66
23
$\eta$
104 1
27
28
133 1
32
33
161 1

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Pa- allels.		
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.	
		Δα	Δδ									
		s	"	°	d	h	m	h	m			
36 Tauri	5.6	+6.01	+17.2	+23 53.0	25	8	30.0	- 1 14.4	-0.7230	0.5801	+0.0703	- 2
192 B. Tauri	6.1	5.98	15.8	22 12.3		12	1.1	+ 2 8.8	+1.2578	0.5806	0.0617	+79
62 Tauri	6.1	6.12	14.6	24 6.8		16	34.5	+ 6 31.8	-0.4761	0.5809	0.0505	+13
v Tauri	4.2	6.07	14.0	22 37.8		17	32.5	+ 7 27.6	+1.1198	0.5810	0.0480	+90
72 Tauri	5.4	6.07	14.0	22 48.9		17	56.8	+ 7 51.1	+0.9471	0.5810	0.0470	+90
284 B. Tauri	6.0	+6.14	+12.7	+23 10.5		21	43.1	+11 28.8	+0.7301	0.5810	+0.0376	+90
τ Tauri	4.3	6.13	11.9	22 48.1	26	0	5.7	-10 14.0	+1.2041	0.5810	0.0317	+89
95 Tauri	6.2	6.19	11.9	23 56.2		0	29.0	- 9 51.6	+0.0292	0.5810	0.0307	+42
300 B. Tauri	6.2	6.18	11.5	23 28.8		1	30.5	- 8 52.4	+0.5368	0.5810	0.0281	+78
315 B. Tauri	6.3	6.26	10.1	24 27.8		5	50.4	- 4 42.3	-0.3956	0.5806	0.0172	+18
99 Tauri	6.0	+6.24	+ 9.8	+23 49.4		6	29.2	- 4 5.0	+0.2873	0.5805	+0.0156	+58
k Tauri	5.6	6.29	9.8	24 55.6		6	36.7	- 3 57.8	-0.8686	0.5805	0.0153	-12
103 Tauri	5.5	6.28	8.3	24 9.5		10	43.9	+ 0 0.1	-0.0218	0.5800	+0.0050	+39
118 Tauri	5.4	6.38	5.2	25 5.1		19	29.3	+ 8 25.9	-1.0515	0.5781	-0.0168	-26
121 Tauri	5.1	6.34	4.2	23 59.2		22	4.7	+10 55.5	+0.0557	0.5774	0.0232	+43
394 B. Tauri	6.0	+6.32	+ 3.0	+23 10.0	27	1	23.0	- 9 53.6	+0.8322	0.5763	-0.0312	+90
132 Tauri	5.0	6.39	2.2	24 32.5		3	44.9	- 7 36.9	-0.7018	0.5755	0.0370	0
412 B. Tauri	5.8	6.39	+ 1.0	24 14.3		7	5.3	- 4 24.0	-0.5192	0.5742	0.0450	+10
1 Geminorum	4.3	6.35	- 0.2	23 16.1		10	8.5	- 1 27.4	+0.3603	0.5730	0.0521	+63
3 Geminorum	5.6	6.34	1.0	23 7.7		12	31.7	+ 0 50.6	+0.3791	0.5719	0.0577	+64
5 Geminorum	5.9	+6.41	- 1.3	+24 26.4		13	16.6	+ 1 33.7	-1.0567	0.5716	-0.0594	-26
6 Geminorum	6.3	6.34	1.4	22 55.7		13	38.0	+ 1 54.4	+0.5264	0.5714	0.0603	+76
η Gemin. (var.)	3.2	6.31	1.8	22 31.9		14	44.0	+ 2 53.0	+0.8800	0.5709	0.0628	+90
8 Geminorum	6.1	6.39	2.0	23 59.8		15	19.4	+ 3 32.1	-0.7145	0.5706	0.0641	- 1
9 Geminorum	6.2	6.38	2.1	23 46.2		15	36.5	+ 3 48.7	-0.4910	0.5705	0.0648	+12
μ Geminorum	3.2	+6.33	- 3.1	+22 33.4		18	11.4	+ 6 18.0	+0.6238	0.5692	-0.0706	+87
36 B. Geminorum	6.0	6.36	3.4	23 22.4		19	17.6	+ 7 21.8	-0.3245	0.5687	0.0731	+22
d Geminorum	5.2	6.27	7.3	21 51.5	28	6	38.2	- 5 41.9	+0.3227	0.5624	0.0975	+61
ζ Gemin. (var.)	3.7	6.21	9.1	20 41.4		12	13.1	- 0 18.7	+0.9978	0.5590	0.1087	+90
44 Geminorum	5.9	6.30	9.4	22 45.6		12	43.2	+ 0 10.4	-1.2742	0.5586	0.1097	-53
120 B. Geminorum	6.5	+6.22	-10.4	+21 23.4		14	54.0	+ 2 16.7	-0.0498	0.5573	-0.1140	+37
56 Geminorum	5.2	6.17	11.7	20 35.9		20	14.8	+ 7 26.5	+0.1639	0.5538	0.1240	+50
149 B. Geminorum	6.4	6.19	12.4	21 41.9		22	28.1	+ 9 35.3	-1.3002	0.5523	0.1280	-59
61 Geminorum	5.8	6.15	12.4	20 25.3		22	31.2	+ 9 38.2	+0.0680	0.5523	0.1281	+44
63 Geminorum	5.3	6.20	12.6	21 36.8		22	52.2	+ 9 58.6	-1.2590	0.5521	0.1287	-47
79 Geminorum	6.3	+6.11	-14.9	+20 30.7	29	6	55.2	- 6 14.6	-1.1699	0.5466	-0.1426	-34
g Geminorum	5.0	6.03	14.9	18 42.6		7	21.2	- 5 46.6	+0.7067	0.5463	0.1433	+90
209 B. Geminorum	6.2	6.05	15.7	19 32.1		10	6.8	- 3 9.2	-0.5786	0.5444	0.1477	+ 8
3 Cancri	5.7	5.95	16.6	17 31.9		14	19.0	+ 0 54.7	+0.9518	0.5416	0.1542	+90
10 H. Cancri	6.1	5.99	17.4	19 4.4		16	10.8	+ 2 43.0	-1.0057	0.5404	0.1570	-19
ζ Cancri (mean)	4.7	+5.93	-18.3	+17 53.6		19	45.9	+ 6 11.0	-0.3014	0.5379	-0.1621	+23
d² Cancri	6.2	5.84	19.9	17 18.9	30	2	23.3	-11 24.1	-0.7783	0.5334	0.1711	- 3
90 B. Cancri	6.3	5.75	20.7	15 35.7		7	28.0	- 6 29.0	+0.2069	0.5301	0.1774	+52
54 Cancri	6.3	5.68	22.3	15 39.2		14	54.4	+ 0 43.7	-1.2088	0.5254	0.1858	-35
209 B. Cancri	6.5	5.50	23.7	11 53.8	31	0	29.3	+10 1.4	+1.0708	0.5197	0.1953	+90
222 B. Cancri	6.3	+5.47	-24.4	+11 50.6		4	39.8	- 9 55.5	+0.3076	0.5174	-0.1989	+58
ξ Leonis	5.1	5.39	25.7	11 39.7		12	1.5	- 2 46.7	-0.9796	0.5135	0.2047	-15
h Leonis	5.2	5.36	25.3	10 4.5		12	2.7	- 2 45.5	+0.7579	0.5135	0.2047	+90
o Leonis	3.8	+5.31	-26.1	+10 15.8		16	54.3	+ 1 57.7	-0.4515	0.5111	-0.2080	+16

## OCCULTATIONS VISIBLE AT



## OCCULTATIONS VISIBLE AT

~~WASHINGTON~~




*NOTE.*—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.  
 † Immersion below the horizon of Washington. ‡ Emergence below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Dura- tion of Occul- tation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
			h m	h m	°	°	h m	h m	°	°	h m
Nov. 28	284 B. Tauri	6.0	23 8	6 38	114	170	23 56	7 27	221	278	0 48
28	300 B. Tauri	6.2	4 15	11 45	154	172	4 47	12 17	197	193	0 31
30	d Geminorum	5.2	9 56	17 17	66	10	10 46	18 8	333	276	0 50
Dec. 1	g Geminorum	5.0	10 56	18 13	135	81	12 1	19 18	274	218	1 5
3	222 B. Cancrī	6.3	6 22	13 32	120	168	7 47	14 57	294	327	1 25
5	237 B. Leonis	6.3	11 23	18 24	162	151	12 35	19 36	271	241	1 11
6	e Leonis	5.1	7 9	14 7	182	230	7 41	14 39	237	283	0 32
22	101 Piscium	6.2	7 23	13 18	103	51	8 12	14 7	228	178	0 49
24	ζ Arietis	5.0	23 30	5 18	87	144	0 36	6 25	230	283	1 7
27	3 Geminorum	5.6	23 58	5 34	69	122	0 54	6 30	286	343	0 56
27	6 Geminorum	6.3	1 9	6 45	120	177	2 6	7 42	237	295	0 57
27	μ Geminorum	3.2	8 3	13 39	178	130	8 27	14 3	212	160	0 24

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.

**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.  
FOR GREENWICH MEAN NOON.**

In the above table, *P* is the  
the north point of the disk, while   
tively, of the center of the disk.  are   
passed through the ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Green-  
wich Mean Noon.

## MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.

FOR

MEAN NOON.

Daily motion of  $F'$  . . . . .  $+8'.684$   
 Daily motion of  $\Omega$  . . . . .  $-3'.177$

EPHEMERIS FOR  
FOROBSER  
MEAN

## OF THE MOON.

	15	7.34	6.84	0.01	0.01	181.48	0.15	22.57
	16	-7.67	+0.08	-0.01	+0.01	193.64	+0.18	20.91
	17	7.62	6.16	0.01	0.01	205.81	0.20	18.02
	18	7.14	5.29	0.01	0.01	217.99	0.23	13.83
	19	6.23	4.07	0.01	0.01	230.17	0.25	8.48
	20	4.91	2.56	0.01	0.01	242.36	0.28	2.35
	21	-3.23	+0.84	-0.01	+0.01	254.55	+0.31	856.01
	22	-1.31	-0.96	0.01	0.01	266.74	0.34	350.08
	23	+0.72	2.70	0.01	0.01	278.93	0.36	345.03
	24	2.70	4.25	0.01	0.01	291.12	0.39	341.12
	25	4.48	5.48	0.01	0.01	303.32	0.42	338.45
	26	+5.93	-6.31	-0.01	+0.01	315.50	+0.46	337.08
	27	6.97	6.74	0.01	0.01	327.68	0.48	336.82
	28	7.55	6.76	0.01	0.01	339.85	0.51	336.01
	29	7.68	6.40	0.01	0.01	352.02	0.54	340.34
	30	7.40	5.74	0.01	0.01	4.18	0.57	343.72
	31	+6.76	-4.81	-0.01	+0.01	16.33	+0.60	347.08
Feb.	1	5.83	3.68	0.01	0.01	28.48	0.63	352.85
	2	4.68	2.40	0.01	0.01	40.63	0.66	357.99
	3	3.38	-1.04	0.01	0.01	52.77	0.69	1.08
	4	2.01	+0.37	0.01	0.02	64.91	0.72	7.86
	5	+0.60	+1.75	-0.01	+0.02	77.05	+0.75	12.14
	6	-0.80	3.05	0.01	0.02	89.18	0.77	15.80
	7	2.14	4.23	0.01	0.02	101.32	0.80	18.77
	8	3.40	5.23	0.02	0.02	113.46	0.82	21.02
	9	4.55	6.01	0.02	0.02	125.59	0.84	22.50
	10	-5.55	+6.52	-0.02	+0.02	137.73	+0.86	23.14
	11	6.37	6.74	0.02	0.02	149.88	0.88	22.84
	12	6.98	6.65	0.02	0.02	162.03	0.90	21.61
	13	7.33	6.23	0.02	0.02	174.19	0.92	19.03
	14	7.38	5.48	0.02	0.02	186.36	0.93	16.38
	15	-7.10	+4.41	-0.02	+0.02	198.53	+0.95	10.54
	16	-6.44	+3.06	-0.02	+0.02	210.71	+0.97	4.84

EPHEMERIS FOR PHYSICAL

OF THE MOON.

FOR

MEAN

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OF THE MOON.

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OF THE MOON.



**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.**  
**FOR GREENWICH MEAN MIDNIGHT.**

Date.		Long.	Lat.	
		°	°	
July	1	-6.32	+4.40	32
	2	5.63	3.01	33
	3	4.58	+1.40	36
	4	3.22	-0.33	55
	5	-1.65	2.06	37
	6	+0.03	-3.66	01
	7	1.69	5.01	02
	8	3.22	6.01	32
	9	4.53	6.61	36
	10	5.54	6.79	67
	11	+6.23	-6.57	77
	12	6.58	5.98	13
	13	6.59	5.09	53
	14	6.31	3.95	08
	15	5.76	2.64	15
	16	+4.99	-1.22	48
	17	4.04	+0.23	71
	18	2.93	1.66	56
	19	1.70	3.00	85
	20	+0.41	4.19	47
	21	-0.93	+5.21	37
	22	2.27	6.00	52
	23	3.56	6.53	88
	24	4.74	6.79	40
	25	5.78	6.76	08
	26	-6.59	+6.41	52
	27	7.11	5.75	03
	28	7.30	4.78	15
	29	7.08	3.53	26
	30	6.44	2.04	51
	31	-5.36	+0.38	35
Aug.	1	3.88	-1.35	31
	2	2.09	3.02	36
	3	-0.10	4.49	44
	4	+1.92	5.64	17
	5	+3.79	-6.39	19
	6	5.39	6.70	56
	7	6.60	6.57	30
	8	7.37	6.05	38
	9	7.68	5.21	67
	10	+7.58	-4.11	06
	11	7.11	2.84	03
	12	6.34	1.46	22
	13	5.35	-0.03	48
	14	4.20	+1.38	42
	15	+2.93	+2.71	84
	16	+1.61	+3.92	04

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.

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~~1850-1926~~

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Date.

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Aug 16

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Sept. 1

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Oct. 1

EPHEMERIS FOR

OBSERVATIONS OF THE MOON.

FOR

MEAN

~~PERIOD~~~~OF~~~~THE~~

EPHEMERIS FOR ~~1917~~ OBSERVATIONS OF THE MOON.  
FOR MEAN MIDNIGHT.

624 ILLUMINATED DISK OF MERCURY, 1917.

FOR GREENWICH MEAN NOON.

Date.	<i>k</i>	<i>i</i>	<i>θ</i>	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	<i>θ</i>	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.650	72	352	59.1	-0.4	July 5	0.934	30	185	67.5	-1.4
6	0.451	96	347	61.5	-0.1	10	0.993	9	212	65.6	1.8
11	0.212	125	342	41.8	+0.8	15	0.990	12	344	57.8	1.6
16	0.035	158	324	8.4	2.1	20	0.947	27	3	48.7	1.1
21	0.026	161	204	6.0	2.3	25	0.888	39	11	41.2	0.7
26	0.158	133	184	27.6	+1.2	30	0.827	49	16	36.1	-0.3
31	0.322	110	178	39.5	0.7	Aug. 4	0.766	58	19	33.0	-0.1
Feb. 5	0.464	94	175	40.3	0.4	9	0.707	66	22	31.4	+0.1
10	0.573	82	171	37.1	0.2	14	0.646	73	24	30.9	0.3
15	0.656	72	168	33.5	0.2	19	0.580	81	26	31.2	0.4
20	0.721	64	164	30.8	+0.1	24	0.504	90	28	32.1	+0.6
25	0.775	57	160	29.2	0.0	29	0.415	100	30	32.7	0.7
Mar. 2	0.821	50	157	28.6	-0.1	Sept. 3	0.309	112	32	31.4	0.9
7	0.862	44	153	29.1	0.2	8	0.188	129	36	25.2	1.3
12	0.901	37	150	31.0	0.4	13	0.071	149	44	12.3	2.0
17	0.939	29	146	34.4	-0.7	18	0.006	171	96	1.3	+2.9
22	0.972	19	142	39.9	1.0	23	0.056	153	192	11.5	2.0
27	0.996	7	125	47.9	1.5	28	0.228	123	203	40.6	-0.8
Apr. 1	0.994	9	351	58.0	1.6	Oct. 3	0.464	94	207	63.2	-0.1
6	0.943	28	337	67.4	1.4	8	0.681	69	209	66.5	0.6
11	0.826	49	336	70.3	-1.1	13	0.835	48	211	57.8	-0.9
16	0.663	71	336	64.4	-0.6	18	0.925	32	212	46.8	1.0
21	0.489	91	337	53.0	0.0	23	0.971	20	213	38.0	1.0
26	0.330	110	338	40.0	+0.6	28	0.993	10	214	31.9	1.0
May 1	0.198	127	339	27.2	1.2	Nov. 2	1.000	2	225	28.0	1.0
6	0.094	144	340	14.6	+1.9	7	0.998	5	21	25.6	-0.8
11	0.026	162	342	4.4	2.6	12	0.991	11	22	24.6	0.7
16	0.000	178	40	0.0	3.5	17	0.978	17	20	24.7	0.6
21	0.020	164	149	3.3	2.8	22	0.959	23	17	25.9	0.5
26	0.075	148	152	11.2	2.1	27	0.932	30	14	28.4	0.4
31	0.154	134	154	19.8	+1.6	Dec. 2	0.893	38	10	32.4	-0.4
June 5	0.243	121	156	27.0	1.2	7	0.834	48	6	38.5	0.4
10	0.340	109	158	33.0	0.8	12	0.745	61	2	46.7	0.4
15	0.446	96	161	38.8	+0.5	17	0.608	78	358	55.5	-0.3
20	0.562	83	165	45.6	0.0	22	0.412	100	354	57.0	+0.1
25	0.691	68	169	53.7	-0.4	27	0.181	130	350	36.7	+0.9
30	0.824	50	176	62.3	-0.9	32	0.019	164	328	4.8	+2.3

NOTATION.

- k*=the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.
- i*=the angle between the Sun and Earth, as seen from the planet.
- θ*=the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.
- L*=the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

FOR GREENWICH MEAN NOON.

Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.885	39.6	189.5	61.0	−3.4	July 5	0.945	27.2	8.7	52.2	−3.3
6	0.895	37.8	186.7	59.5	3.4	10	0.936	29.2	10.9	52.9	3.3
11	0.904	36.0	183.7	58.2	3.4	15	0.927	31.2	12.9	53.8	3.3
16	0.913	34.3	180.6	57.0	3.4	20	0.918	33.2	14.8	54.8	3.3
21	0.921	32.5	177.5	55.8	3.4	25	0.908	35.3	16.4	55.8	3.3
26	0.922	30.9	174.3	54.7	−3.4	30	0.898	37.3	17.9	56.9	−3.3
31	0.937	29.2	171.2	53.7	3.3	Aug. 4	0.887	39.3	19.2	58.1	3.3
Feb. 5	0.944	27.5	168.1	52.8	3.3	9	0.876	41.2	20.2	59.4	3.4
10	0.950	25.8	165.2	51.9	3.3	14	0.864	43.2	21.1	60.8	3.4
15	0.956	24.1	162.4	51.2	3.3	19	0.852	45.2	21.7	62.3	3.4
20	0.962	22.4	159.8	50.5	−3.3	24	0.840	47.1	22.1	64.0	−3.4
25	0.967	20.8	157.3	49.8	3.3	29	0.827	49.1	22.3	65.8	3.4
Mar. 2	0.972	19.2	155.0	49.2	3.4	Sept. 3	0.814	51.1	22.3	67.8	3.4
7	0.977	17.5	152.9	48.7	3.4	8	0.801	53.0	22.0	70.0	3.4
12	0.981	15.8	151.0	48.2	3.4	13	0.787	55.0	21.5	72.3	3.5
17	0.985	14.2	149.3	47.8	−3.4	18	0.773	57.0	20.8	74.8	−3.5
22	0.988	12.5	147.6	47.5	3.4	23	0.758	58.9	19.8	77.6	3.5
27	0.991	10.8	146.0	47.2	3.4	28	0.743	60.9	18.7	80.6	3.5
Apr. 1	0.994	9.1	144.2	47.0	3.4	Oct. 3	0.727	62.9	17.3	84.0	3.6
6	0.996	7.4	142.2	46.8	3.4	8	0.712	65.0	15.7	87.6	3.6
11	0.998	5.6	139.2	46.7	−3.4	13	0.695	67.0	13.9	91.5	−3.6
16	0.999	4.0	133.7	46.6	3.5	18	0.678	69.1	11.9	95.9	3.7
21	1.000	2.3	119.8	46.6	3.5	23	0.661	71.2	9.7	100.7	3.7
26	1.000	1.3	69.0	46.6	3.5	28	0.643	73.4	7.5	105.9	3.7
May 1	1.000	2.2	11.6	46.7	3.5	Nov. 2	0.624	75.7	5.1	111.7	3.8
6	0.999	3.8	356.2	46.8	−3.5	7	0.604	78.0	2.7	118.0	−3.8
11	0.998	5.6	351.5	47.0	3.4	12	0.584	80.4	0.3	125.0	3.9
16	0.996	7.5	350.0	47.2	3.4	17	0.562	82.9	357.9	132.5	3.9
21	0.993	9.4	350.2	47.5	3.4	22	0.539	85.5	355.6	140.8	4.0
26	0.990	11.3	351.2	47.8	3.4	27	0.515	88.2	353.3	149.8	4.0
31	0.987	13.3	352.7	48.2	−3.4	Dec. 2	0.490	91.1	351.2	159.4	−4.1
June 5	0.983	15.2	354.6	48.6	3.4	7	0.463	94.2	349.2	169.9	4.2
10	0.978	17.2	356.8	49.0	3.4	12	0.434	97.6	347.4	180.8	4.2
15	0.972	19.2	359.2	49.6	3.4	17	0.404	101.1	345.7	192.0	4.3
20	0.966	21.2	1.6	50.1	3.4	22	0.370	105.1	344.1	202.5	4.3
25	0.960	23.2	4.0	50.7	−3.3	27	0.334	109.4	342.6	212.0	−4.4
30	0.953	25.2	6.4	51.4	−3.3	32	0.295	114.2	341.0	218.4	−4.4

NOTATION.

*k* = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

*i* = the angle between the Sun and Earth, as seen from the planet.

$\theta$  = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

*L* = the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

EPHEMERIS FOR  
FOR

OBSERVATIONS OF MARS.  
MEAN NOON.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.  
FOR GREENWICH MEAN NOON.

FOR GREENWICH MEAN NOON.							Mean Time of Transit of Zero Meridian.		
Date.		k	Diameter.	i	q	Q	Central Meridian.	Of Date.	Of Intermedi- ate Date.
			"	°	"	°	°	h m	h m
Oct.	1	0.927	5.25	31.32	0.38	287.00	288.41	4 54.3	5 34.1
	3	0.926	5.29	31.57	0.39	287.35	269.03	6 14.0	6 53.8
	5	0.925	5.33	31.82	0.40	287.69	249.64	7 33.6	8 13.5
	7	0.924	5.37	32.06	0.41	288.00	230.26	8 53.3	9 33.2
	9	0.923	5.41	32.29	0.42	288.33	210.87	10 13.0	10 52.8
	11	0.922	5.45	32.53	0.43	288.64	191.49	11 32.7	12 12.5
	13	0.920	5.49	32.76	0.44	288.94	172.11	12 52.3	13 32.2
	15	0.919	5.53	32.98	0.45	289.22	152.74	14 12.0	14 51.8
	17	0.918	5.58	33.20	0.46	289.50	133.36	15 31.6	16 11.4
	19	0.917	5.63	33.42	0.47	289.76	113.99	16 51.2	17 31.0
	21	0.916	5.68	33.63	0.48	290.02	94.63	18 10.8	18 50.6
	23	0.915	5.72	33.84	0.49	290.26	75.26	19 30.4	20 10.2
	25	0.914	5.78	34.04	0.50	290.50	55.91	20 50.0	21 29.7
	27	0.913	5.83	34.24	0.50	290.72	36.56	22 9.5	22 49.3
	29	0.912	5.88	34.43	0.51	290.94	17.21	23 29.0	...
Nov.	31	0.911	5.94	34.61	0.52	291.14	357.86	0 8.8	0 48.6
	2	0.911	6.00	34.79	0.54	291.33	338.52	1 28.3	2 8.0
	4	0.910	6.06	34.97	0.55	291.52	319.19	2 47.8	3 27.5
	6	0.909	6.12	35.14	0.56	291.69	299.86	4 7.2	4 46.9
	8	0.908	6.18	35.30	0.57	291.85	280.54	5 26.6	6 6.3
	10	0.907	6.25	35.45	0.58	292.00	261.23	6 46.0	7 25.6
	12	0.907	6.31	35.59	0.59	292.15	241.92	8 5.3	8 45.0
	14	0.906	6.38	35.73	0.60	292.28	222.62	9 24.6	10 4.3
	16	0.905	6.45	35.86	0.61	292.40	203.34	10 43.9	11 23.5
	18	0.905	6.53	35.97	0.62	292.52	184.06	12 3.1	12 42.7
	20	0.904	6.60	36.08	0.63	292.62	164.80	13 22.3	14 1.8
	22	0.904	6.68	36.18	0.64	292.72	145.54	14 41.4	15 21.0
	24	0.903	6.76	36.27	0.65	292.81	126.30	16 0.5	16 40.0
	26	0.903	6.85	36.35	0.67	292.88	107.06	17 19.5	17 59.0
	28	0.902	6.93	36.42	0.68	292.95	87.85	18 38.5	19 17.9
Dec.	30	0.902	7.02	36.47	0.69	293.01	68.64	19 57.4	20 36.8
	2	0.902	7.11	36.51	0.70	293.06	49.45	21 16.2	21 55.6
	4	0.902	7.21	36.54	0.71	293.10	30.27	22 35.0	23 14.4
	6	0.902	7.30	36.56	0.72	293.14	11.11	23 53.7	...
	8	0.902	7.40	36.56	0.73	293.16	351.96	0 33.0	1 12.4
	10	0.902	7.51	36.55	0.74	293.18	332.83	1 51.6	2 30.9
	12	0.902	7.62	36.52	0.75	293.19	313.72	3 10.2	3 49.4
	14	0.902	7.73	36.48	0.76	293.19	294.63	4 28.6	5 7.8
	16	0.902	7.84	36.42	0.76	293.18	275.56	5 47.0	6 26.1
	18	0.903	7.96	36.34	0.77	293.17	256.51	7 5.2	7 44.3
	20	0.903	8.08	36.24	0.78	293.14	237.48	8 23.4	9 2.4
	22	0.904	8.20	36.12	0.79	293.11	218.47	9 41.4	10 20.4
	24	0.905	8.33	35.98	0.80	293.07	199.49	10 59.4	11 38.4
	26	0.905	8.47	35.82	0.80	293.03	180.53	12 17.3	12 56.2
	28	0.906	8.60	35.64	0.81	292.97	161.60	13 35.0	14 13.9
30	0.907	8.74	35.43	0.81	292.91	142.70	14 52.7	15 31.4	
32	0.909	8.89	35.20	0.81	292.84	123.82	16 10.1	...	



EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.  
FOR GREENWICH MEAN NOON.

Date.		Light-Time.	Stellar Magni-tude.	<i>P</i>	$A_{\oplus}+180^{\circ}$	$D_{\oplus}$	$A_{\odot}+180^{\circ}$	$D_{\odot}$
		m		.	.	.	.	.
Jan.	1	38.42	-2.1	337.30	249.92	+2.88	260.94	+3.03
	8	39.34	2.1	337.37	250.28	2.85	261.58	3.04
	15	40.27	2.0	337.47	250.80	2.83	262.21	3.04
	22	41.20	2.0	337.60	251.46	2.81	262.85	3.04
	29	42.13	1.9	337.77	252.27	2.80	263.48	3.05
Feb.	5	43.03	-1.9	337.96	253.20	+2.79	264.12	+3.05
	12	43.91	1.8	338.19	254.24	2.79	264.76	3.06
	19	44.75	1.8	338.45	255.39	2.79	265.39	3.06
	26	45.55	1.8	338.73	256.64	2.79	266.02	3.06
Mar.	5	46.29	1.7	339.05	257.96	2.79	266.66	3.06
	12	46.98	-1.7	339.40	259.36	+2.80	267.29	+3.07
	19	47.60	1.7	339.78	260.82	2.81	267.93	3.07
	26	48.15	1.6	340.18	262.33	2.82	268.56	3.07
Apr.	2	48.64	1.6	340.61	263.89	2.83	269.20	3.07
	9	49.04	1.6	341.07	265.48	2.85	269.83	3.07
June	5	49.39	-1.6	345.51	278.88	+2.94	274.97	+3.06
	12	49.07	1.6	346.10	280.48	2.95	275.60	3.06
	19	48.68	1.6	346.69	282.04	2.95	276.23	3.05
	26	48.22	1.6	347.28	283.56	2.96	276.86	3.05
July	3	47.69	1.6	347.87	285.03	2.97	277.49	3.04
	10	47.10	-1.7	348.43	286.45	+2.98	278.12	+3.04
	17	46.45	1.7	348.98	287.80	2.98	278.74	3.03
	24	45.74	1.7	349.51	289.08	2.99	279.37	3.03
	31	44.99	1.8	350.01	290.28	2.99	280.00	3.02
Aug.	7	44.19	1.8	350.48	291.39	3.00	280.62	3.02
	14	43.36	-1.8	350.91	292.40	+3.01	281.25	+3.01
	21	42.50	1.9	351.30	293.30	3.01	281.87	3.00
	28	41.63	1.9	351.63	294.07	3.02	282.50	3.00
Sept.	4	40.74	2.0	351.92	294.72	3.02	283.12	2.99
	11	39.86	2.0	352.14	295.23	3.03	283.75	2.98
	18	38.99	-2.1	352.29	295.59	+3.04	284.37	+2.97
	25	38.14	2.1	352.38	295.79	3.05	284.99	2.96
Oct.	2	37.33	2.2	352.40	295.83	3.05	285.62	2.96
	9	36.57	2.2	352.35	295.70	3.06	286.24	2.95
	16	35.88	2.2	352.22	295.41	3.07	286.86	2.94
	23	35.26	-2.3	352.02	294.96	+3.07	287.48	+2.93
Nov.	30	34.73	2.3	351.77	294.37	3.07	288.10	2.92
	6	34.31	2.3	351.46	293.65	3.07	288.72	2.91
	13	33.99	2.4	351.10	292.82	3.07	289.34	2.90
	20	33.80	2.4	350.71	291.92	3.06	289.96	2.89
Dec.	27	33.73	-2.4	350.31	290.97	+3.05	290.58	+2.87
	4	33.79	2.4	349.91	290.02	3.03	291.20	2.86
	11	33.98	2.4	349.52	289.10	3.01	291.82	2.85
	18	34.29	2.3	349.16	288.23	2.99	292.43	2.84
	25	34.71	2.3	348.85	287.47	2.96	293.05	2.82
	32	35.25	-2.3	348.59	286.82	+2.94	293.67	+2.81

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

Date.		Equa- torial Diameter.	Excess of Equat. Diameter over Polar.	i	q	Q	Central Meridian.		Correction for Phase.
							System I.	System II.	
		"	"	°	"	°	°	°	°
Jan.	1	43.34	2.62	11.00	0.40	68.38	16.63	176.53	-0.53
	8	42.34	2.56	11.28	0.41	68.60	41.01	147.51	0.55
	15	41.36	2.50	11.40	0.41	68.82	65.22	118.32	0.56
	22	40.42	2.45	11.37	0.40	69.07	89.29	88.98	0.56
	29	39.53	2.39	11.20	0.38	69.33	113.22	59.51	0.55
Feb.	5	38.70	2.34	10.91	0.35	69.62	137.04	29.92	-0.52
	12	37.92	2.29	10.50	0.32	69.93	160.76	0.23	0.48
	19	37.21	2.25	10.00	0.28	70.27	184.39	330.46	0.44
	26	36.56	2.21	9.39	0.25	70.65	207.97	300.63	0.38
Mar.	5	35.97	2.18	8.69	0.21	71.07	231.49	270.75	0.33
	12	35.45	2.15	7.93	0.17	71.53	254.97	240.82	-0.27
	19	34.98	2.12	7.10	0.13	72.06	278.43	210.88	0.22
	26	34.58	2.09	6.23	0.10	72.64	301.88	180.92	0.17
Apr.	2	34.24	2.07	5.31	0.07	73.32	325.33	150.96	0.12
	9	33.96	2.05	4.35	0.05	74.19	348.79	121.02	-0.08
June	5	33.71	2.04	3.91	0.04	253.63	335.48	32.79	+0.07
	12	33.93	2.05	4.87	0.06	254.68	359.38	3.28	0.10
	19	34.20	2.07	5.80	0.09	255.57	23.35	333.84	0.15
	26	34.53	2.09	6.69	0.12	256.37	47.41	304.49	0.20
July	3	34.92	2.11	7.53	0.15	257.11	71.57	275.23	0.25
	10	35.36	2.14	8.32	0.19	257.79	95.81	246.06	+0.30
	17	35.85	2.17	9.04	0.23	258.43	120.16	217.00	0.36
	24	36.41	2.20	9.70	0.26	259.02	144.61	188.03	0.41
	31	37.02	2.24	10.27	0.30	259.58	169.17	159.18	0.46
Aug.	7	37.68	2.28	10.75	0.33	260.11	193.84	130.44	0.50
	14	38.40	2.32	11.13	0.36	260.59	218.64	101.82	+0.54
	21	39.18	2.37	11.40	0.39	261.03	243.57	73.33	0.56
	28	40.00	2.42	11.56	0.41	261.43	268.62	44.98	0.58
Sept.	4	40.87	2.47	11.58	0.42	261.79	293.81	16.75	0.58
	11	41.78	2.53	11.47	0.42	262.08	319.14	348.67	0.57
	18	42.71	2.58	11.20	0.41	262.33	344.62	320.73	+0.54
	25	43.66	2.64	10.78	0.38	262.53	10.23	292.93	0.50
Oct.	2	44.60	2.70	10.19	0.35	262.68	35.99	265.27	0.45
	9	45.53	2.75	9.45	0.31	262.79	61.88	237.74	0.39
	16	46.41	2.81	8.54	0.26	262.86	87.89	210.34	0.32
	23	47.22	2.86	7.47	0.20	262.92	114.01	183.05	+0.24
Nov.	30	47.94	2.90	6.26	0.14	263.02	140.23	155.85	0.17
	6	48.54	2.94	4.92	0.09	263.24	166.50	128.72	0.10
	13	48.99	2.96	3.47	0.04	263.85	192.82	101.63	0.05
	20	49.27	2.98	1.96	0.01	265.76	219.15	74.54	+0.02
Dec.	27	49.37	2.99	0.43	0.00	284.11	245.44	47.42	0.00
	4	49.28	2.98	1.19	0.01	71.73	271.65	20.22	-0.01
	11	49.01	2.97	2.71	0.03	76.18	297.76	352.93	0.03
	18	48.57	2.94	4.20	0.06	77.20	323.74	325.49	0.08
	25	47.97	2.90	5.58	0.11	77.58	349.54	297.89	0.14
	32	47.24	2.86	6.83	0.17	77.73	15.16	270.10	-0.20

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM I.

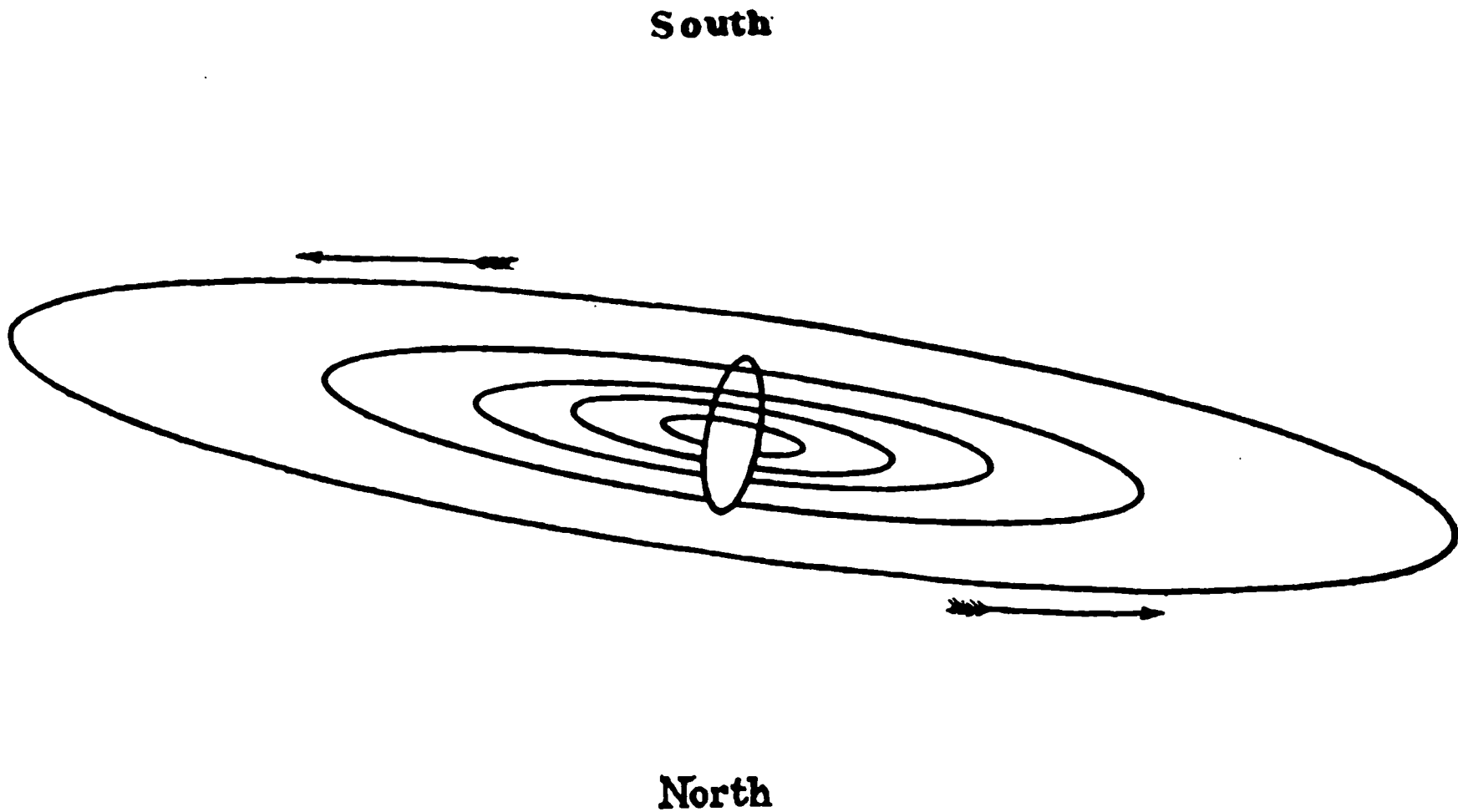
GREENWICH MEAN TIME.

Transit of Zero Meridian.				Interval between Successive Transits.		Transit of Zero Meridian.				Interval between Successive Transits.		Transit of Zero Meridian.				Interval between Successive Transits.	
				h	m					h	m					h	m
Jan.	d	h	m	9	50.59	June	d	h	m	9	50.63	Sept.	d	h	m	9	50.47
	1	9	24.17				5	0	40.13				19	15	46.25		
	3	10	37.10				7	1	53.30				21	16	58.63		
	5	11	50.05				9	3	6.45				23	18	10.99		
	7	13	3.03				11	4	19.60				25	19	23.33		
	9	14	16.03	13	5	32.74	27	20	35.65	Oct.	29	21	47.95	9	50.45		
	11	15	29.05	15	6	45.86	9	50.62	1		23	0.24					
	13	16	42.09	17	7	58.97	4	0	12.50								
	15	17	55.15	19	9	12.07	6	1	24.75								
	17	19	8.22	21	10	25.15	8	2	36.99								
19	20	21.32	23	11	38.22	25	12	51.28	10	3	49.21	9	50.44				
21	21	34.43	27	14	4.33	9	50.61	12	5	1.41							
23	22	47.56	29	15	17.36	14	6	13.60									
26	0	0.71	1	16	30.38	16	7	25.76									
28	1	13.87	3	17	43.39	18	8	37.92									
30	2	27.05	5	18	56.38	9	50.59	20	9	50.06	9	50.42					
Feb.	3	4	53.44	7	20	9.36	22	11	2.19								
	5	6	6.66	9	21	22.33	24	12	14.30								
	7	7	19.89	11	22	35.28	26	13	26.40								
	9	8	33.13	13	23	48.21	28	14	38.50								
	11	9	46.39	16	1	1.13	9	50.58	30	15	50.57	9	50.41				
	13	10	59.65	18	2	14.04	Nov.	1	17	2.64							
	15	12	12.92	20	3	26.93	3	18	14.70								
	17	13	26.20	22	4	39.82	5	19	26.75								
	19	14	39.49	24	5	52.68	7	20	38.80								
	21	15	52.79	26	7	5.52	9	50.56	9	21	50.84	9	50.40				
23	17	6.10	28	8	18.36	11	23	2.87									
25	18	19.41	30	9	31.18	14	0	14.89									
27	19	32.73	1	10	43.98	16	1	26.92									
1	20	46.06	3	11	56.77	18	2	38.94									
Mar.	3	21	59.39	5	13	9.54	9	50.55	20	3	50.97	9	50.41				
	5	23	12.73	7	14	22.29	22	5	3.00								
	8	0	26.07	9	15	35.03	24	6	15.03								
	10	1	39.42	11	16	47.75	26	7	27.07								
	12	2	52.77	13	18	0.46	28	8	39.12								
	14	4	6.13	15	19	13.15	9	50.53	30	9	51.17	9	50.42				
	16	5	19.48	17	20	25.82	Dec.	2	11	3.24							
	18	6	32.84	19	21	38.48	4	12	15.32								
	20	7	46.21	21	22	51.12	6	13	27.43								
	22	8	59.57	24	0	3.74	8	14	39.55								
24	10	12.94	26	1	16.35	9	50.51	10	15	51.69	9	50.44					
26	11	26.31	28	2	28.94	12	17	3.86									
28	12	39.67	30	3	41.51	14	18	16.05									
30	13	53.04	1	4	54.06	16	19	28.26									
1	15	6.41	3	6	6.60	18	20	40.50									
Apr.	3	16	19.78	5	7	19.12	9	50.50	20	21	52.77	9	50.46				
	5	17	33.14	7	8	31.62	22	23	5.06								
	7	18	46.50	9	9	44.10	25	0	17.38								
	9	19	59.87	11	10	56.57	27	1	29.73								
	11	21	13.23	13	12	9.02	29	2	42.10								
	. . . . .			15	13	21.45	9	50.48	31	3	54.50	9	50.49				
	. . . . .			17	14	33.86	33	5	6.93								

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM II.

GREENWICH MEAN TIME.

Transit of Zero Meridian.				Interval between Successive Transits.	Transit of Zero Meridian.				Interval between Successive Transits.	Transit of Zero Meridian.				Interval between Successive Transits.	
d h m				h m	d h m				h m	d h m				h m	
Jan.	1	5	4.49	9 55.77	June	5	9	1.44	9 55.81	Sept.	20	22	33.66	9 55.65	
	3	6	43.31			7	10	40.50			23	0	11.91		
	5	8	22.15			9	12	19.56			25	1	50.14		
	7	10	1.02			11	13	58.60			27	3	28.36		
	9	11	39.91			13	15	37.63			29	5	6.55		
	11	13	18.82	9 55.79		15	17	16.65	9 55.80	Oct.	1	6	44.73	9 55.63	
	13	14	57.75			17	18	55.65			3	8	22.89		
	15	16	36.70			19	20	34.64			5	10	1.04		
	17	18	15.67			21	22	13.62			7	11	39.15		
	19	19	54.66			23	23	52.59			9	13	17.25		
21	21	33.67	9 55.81		26	1	31.54	9 55.78		11	14	55.34	9 55.61		
23	23	12.69			28	3	10.48			13	16	33.41			
26	0	51.73			30	4	49.41			15	18	11.47			
28	2	30.79			July	2	6			28.32	17	19		49.51	
30	4	9.86				4	8			7.22	19	21		27.54	
Feb.	1	5	48.95	9 55.82		6	9	46.10	9 55.77		21	23	5.55	9 55.60	
	3	7	28.05			8	11	24.97			24	0	43.55		
	5	9	7.16			10	13	3.82			26	2	21.53		
	7	10	46.29			12	14	42.66			28	3	59.50		
	9	12	25.43			14	16	21.49			30	5	37.46		
	11	14	4.58	9 55.83		16	18	0.31	9 55.76	Nov.	1	7	15.41	9 55.59	
	13	15	43.74			18	19	39.10			3	8	53.35		
	15	17	22.91			20	21	17.89			5	10	31.29		
	17	19	2.09			22	22	56.65			7	12	9.21		
	19	20	41.28			25	0	35.41			9	13	47.12		
21	22	20.48	9 55.84		27	2	14.14	9 55.74		11	15	25.04	9 55.58		
23	23	59.69			29	3	52.86			13	17	2.94			
26	1	38.90			31	5	31.57			15	18	40.84			
28	3	18.12			Aug.	2	7			10.26	17	20		18.75	
2	4	57.34				4	8			48.93	19	21		56.65	
Mar.	4	6	36.58	9 55.85		6	10	27.59	9 55.73		21	23	34.55	9 55.58	
	6	8	15.81			8	12	6.23			24	1	12.47		
	8	9	55.06			10	13	44.85			26	2	50.33		
	10	11	34.31			12	15	23.46			28	4	28.31		
	12	13	13.56			14	17	2.05			30	6	6.24		
	14	14	52.81	9 55.85		16	18	40.62	9 55.71	Dec.	2	7	44.19	9 55.60	
	16	16	32.07			18	20	19.18			4	9	22.15		
	18	18	11.33			20	21	57.72			6	11	0.13		
	20	19	50.59			22	23	36.24			8	12	38.13		
	22	21	29.85			25	1	14.74			10	14	16.15		
24	23	9.12	9 55.85		27	2	53.23	9 55.69		12	15	54.19	9 55.62		
27	0	48.39			29	4	31.70			14	17	32.26			
29	2	27.66			31	6	10.15			16	19	10.35			
31	4	6.93			Sept.	2	7			48.58	18	20		48.47	
2	5	46.19				4	9			27.00	20	22		26.62	
Apr.	4	7	25.46	9 55.85		6	11	5.39	9 55.67		23	0	4.79	9 55.65	
	6	9	4.72			8	12	43.77			25	1	42.99		
	8	10	43.98			10	14	22.14			27	3	21.22		
	10	12	23.25			12	16	0.48			29	4	59.48		
	12	14	2.49			14	17	38.80			31	6	37.77		
	. . . . .						16	19	17.11	9 55.65		33	8	16.08	9 55.67
	. . . . .						18	20	55.40			35	9	54.41	



*APPARENT ORBITS OF THE SATELLITES OF JUPITER AT DATE OF OPPOSITION, NOVEMBER 28, 1917, AS SEEN IN AN INVERTING TELESCOPE, AND ELONGATED IN THE RATIO OF THREE TO ONE IN THE DIRECTION OF THEIR MINOR AXES.*

In the above diagram the central ellipse represents the disk of Jupiter, and the inner orbit is that of Satellite V.

In the diagrams of the configurations of Jupiter's four brighter satellites, pages 637-657, Jupiter is represented by a light disk, ○, in the center of the page, and the relative positions of the satellites at the Greenwich time stated above the diagrams are indicated by dots. The designation of each satellite is shown by a numeral placed to the right or left of the dot, according as the motion of the satellite at the instant in question is toward the east or toward the west, the motion being always toward the numeral. In constructing the diagrams the latitudes of the satellites are always considered zero, except where two or more of them chance to be at nearly the same distance from the planet, when they are placed one above the other, according to their apparent latitudes. If, at the epoch of any configuration, one or more satellites are projected on the disk of the planet, that phenomenon is indicated by a light disk, ○, at the left-hand side of the page; and if any satellites are invisible on account of being occulted behind the disk of the planet, or eclipsed by its shadow, that circumstance is indicated by a dark disk, ●, at the right-hand side of the page. In both cases the annexed numerals serve to point out which satellites are thus rendered invisible.

*MEAN SYNODIC PERIODS OF THE SATELLITES.*

	d	h	m	s	d		d	h	m	s	d
I.	1	18	28	35.946	=	1.769	860	49			
II.	3	13	17	53.736	=	3.554	094	17			
III.	7	3	59	35.856	=	7.166	387	22			
IV.	16	18	5	6.916	=	16.753	552	27			
						V.	0	11	57	27.635	= 0.498 236 52
						VI.					=266.00
						VII.					=276.67

SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

Jan.	d	h		Oct.	d	h		Jan.	d	h		Oct.	d	h	
	1	10.2	E.		12	22.7	E.		1	16.2	W.		13	4.7	W.
	11	9.3	E.		22	21.8	E.		11	15.3	W.		23	3.8	W.
	21	8.5	E.	Nov.	1	20.9	E.		21	14.5	W.	Nov.	2	2.9	W.
	31	7.7	E.		11	20.0	E.		31	13.7	W.		12	2.0	W.
					21	19.1	E.						22	1.0	W.
Sept.	3	2.3	E.	Dec.	1	18.1	E.	Sept.	3	8.2	W.	Dec.	2	0.1	W.
	13	1.4	E.		11	17.2	E.		13	7.4	W.		11	23.2	W.
	23	0.5	E.		21	16.3	E.		23	6.5	W.		21	22.3	W.
Oct.	2	23.6	E.		31	15.4	E.	Oct.	3	5.6	W.		31	21.4	W.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE I.																			
Jan.				Mar.				July				Oct.							
d	h	m	s	d	h	m	s	d	h	m	s	d	h	m	s				
1	21	29	47	26	2	41	45	20	23	58	36	12	4	14	48				
3	15	58	14	27	21	12	7	22	18	28	15	13	22	41	38				
5	10	26	39	29	15	42	32	24	12	57	48	15	17	8	31				
7	4	55	13	31	10	12	56	26	7	27	21	17	11	35	15				
8	23	23	48	Apr. 2	4	43	20	28	1	56	49	19	6	1	59				
10	17	52	32	3	23	13	45	29	20	26	19	21	0	28	33				
12	12	21	14	5	17	44	12	31	14	55	42	22	18	55	11				
14	6	50	5	7	12	14	39	Aug. 2	9	25	6	24	13	21	39				
16	1	18	56	9	6	45	5	4	3	54	24	26	7	48	9				
17	19	47	57	11	1	15	31	5	22	23	44	28	2	14	29				
19	14	16	54	12	19	46	0	7	16	52	57	29	20	40	53				
21	8	46	1	14	14	16	28	9	11	22	10	31	15	7	8				
23	3	15	7	16	8	46	55	11	5	51	17	Nov. 2	9	33	26				
24	21	44	22	18	3	17	22	13	0	20	27	4	3	59	34				
26	16	13	34	19	21	47	52	14	18	49	28	5	22	25	46				
28	10	42	54	21	16	18	21	16	13	18	30	7	16	51	50				
30	5	12	14	..	..	..	..	18	7	47	25	9	11	17	58				
31	23	41	43	..	..	..	..	20	2	16	22	11	5	43	56				
Feb. 2	18	11	8	..	..	..	..	21	20	45	12	13	0	10	0				
4	12	40	40	June 1	9	58	2	23	15	14	1	14	18	35	57				
6	7	10	13	3	4	28	23	25	9	42	42	16	13	1	57				
8	1	39	52	4	22	58	39	27	4	11	27	18	7	27	50				
9	20	9	29	6	17	28	56	28	22	40	3	20	1	53	49				
11	14	39	12	8	11	59	11	30	17	8	39	21	20	19	41				
13	9	8	55	10	6	29	29	Sept. 1	11	37	6	23	14	45	39				
15	3	38	45	12	0	59	39	3	6	5	37	25	9	11	29				
16	22	8	32	13	19	29	51	5	0	33	58	27	3	37	27				
18	16	38	25	15	14	0	2	6	19	2	20	28	22	3	19				
20	11	8	17	17	8	30	14	8	13	30	33	30	16	29	17				
22	5	38	17	19	3	0	21	10	7	58	49	Dec. 2	10	55	9				
24	0	8	13	20	21	30	29	12	2	26	55	4	5	21	10				
25	18	38	14	22	16	0	35	13	20	55	1	5	23	47	5				
27	13	8	15	24	10	30	41	15	15	22	58	7	18	13	9				
Mar. 1	7	38	21	26	5	0	43	17	9	50	58	9	12	39	6				
3	2	8	25	27	23	30	45	19	4	18	48	11	7	5	13				
4	20	38	33	29	18	0	45	20	22	46	38	13	1	31	17				
6	15	8	41	July 1	12	30	45	22	17	14	18	14	19	57	29				
8	9	38	54	3	7	0	41	24	11	42	2	16	14	23	36				
10	4	9	4	5	1	30	37	26	6	9	35	18	8	49	54				
11	22	39	17	6	20	0	30	28	0	37	9	20	3	16	8				
13	17	9	31	8	14	30	25	29	19	4	32	21	21	42	32				
15	11	39	49	10	9	0	14	Oct. 1	13	31	59	23	16	8	51				
17	6	10	4	12	3	30	3	3	7	59	15	25	10	35	22				
19	0	40	23	13	21	59	49	5	2	26	32	27	5	1	51				
20	19	10	41	15	16	29	36	6	20	53	38	28	23	28	32				
22	13	41	3	17	10	59	17	8	15	20	49	30	17	55					
24	8	11	23	19	5	28	59	10	9	47	48	32	12	21					

634

SATELLITES OF JUPITER, 1917.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE II.																			
Jan.					Mar.					July					Oct.				
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	7	14	45		27	15	57	52		19	13	40	36		12	20	38	27	
4	20	31	0		31	5	24	6		23	3	3	37		16	9	48	50	
8	9	47	49		Apr. 3	18	49	44		26	16	25	48		19	22	58	44	
11	23	5	18		7	8	16	16		30	5	48	3		23	12	8	1	
15	12	23	19		10	21	42	10		Aug. 2	19	9	30		27	1	16	52	
19	1	42	0		14	11	8	57		6	8	30	58		30	14	25	12	
22	15	1	5		18	0	34	59		9	21	51	39		Nov. 3	3	33	7	
26	4	20	54		21	14	1	57		13	11	12	12		6	16	40	36	
29	17	41	1		..	..	..	..		17	0	32	1		10	5	47	46	
Feb. 2	7	1	53		..	..	..	..		20	13	51	38		13	18	54	38	
5	20	22	57		June ..	..	..	..		24	3	10	33		17	8	1	16	
9	9	44	45		3	7	19	48		27	16	29	8		20	21	7	41	
12	23	6	40		6	20	45	19		31	5	47	2		24	10	14	2	
16	12	29	20		10	10	11	32		Sept. 3	19	4	33		27	23	20	19	
20	1	52	3		13	23	36	45		7	8	21	25		Dec. 1	12	26	40	
23	15	15	31		17	13	2	38		10	21	37	50		5	1	33	4	
27	4	38	54		21	2	27	30		14	10	53	34		8	14	39	37	
Mar. 2	18	3	3		24	15	52	54		18	0	8	48		12	3	46	22	
6	7	27	4		28	5	17	21		21	13	23	22		15	16	53	26	
9	20	51	53		July 1	18	42	15		25	2	37	25		19	6	0	50	
13	10	16	23		5	8	6	15		28	15	50	49		22	19	8	36	
16	23	41	45		8	21	30	34		Oct. 2	5	3	36		26	8	16	50	
20	13	6	41		12	10	54	1		5	18	15	49		29	21	25	31	
24	2	32	33		16	0	17	43		9	7	27	24		33	10	34	46	

SATELLITE III.															
Jan.				Apr.				July				Oct.			
d	h	m	s	d	h	m	s	d	h	m	s	d	h	m	s
5	12	3	55	1	15	14	21	18	10	20	8	12	10	17	0
12	16	0	55	8	19	43	22	25	14	38	49	19	13	47	47
19	20	3	2	16	0	13	17	1	18	55	9	26	17	14	7
27	0	9	0	..	..	..	..	8	23	9	21	2	20	36	53
Feb.				June				Aug.				Nov.			
3	4	19	11	..	..	..	..	16	3	19	48	9	23	56	28
10	8	32	7	..	..	..	..	23	7	26	51	17	3	14	9
17	12	48	7	5	7	48	13	30	11	29	36	24	6	29	38
24	17	7	0	12	12	17	1	6	15	28	20	1	9	44	42
Mar.				July				Sept.				Dec.			
3	21	28	35	19	16	45	24	13	19	23	11	8	12	59	46
11	1	52	55	26	21	11	52	20	23	13	38	15	16	16	27
18	6	18	39	4	1	36	53	28	3	0	1	22	19	36	7
25	10	46	13	11	5	59	32	5	6	40	55	29	22	59	29

SATELLITE IV.														
	d	h	m	s		d	h	m	s		d	h	m	s
Jan.	6	7	33	33	Apr.	17	6	9	23	June	23	17	50	16
	23	1	41	8		..	..	..	..	July	10	14	16	8
Feb.	8	20	41	26		..	..	..	..		27	10	16	35
	25	16	24	24		..	..	..	..	Aug.	13	5	42	52
Mar.	14	12	38	46		..	..	..	..		30	0	26	38
	31	9	16	28	June	6	21	6	15	Sept.	15	18	18	54



DIFFERENTIAL COORDINATES OF SATELLITE VI.  
FOR GREENWICH MEAN NOON.

Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$		$\delta_{VI}-\delta_{Jup.}$
	m	s	'		m	s	'		m	s	'
Jan. 0	+4	21	- 5.0	June 18	-2	16	-15.3	Sept. 26	+3	39	-13.2
4	4	20	3.5	22	2	7	16.8	30	3	53	11.1
8	4	18	2.0	26	1	58	18.1	Oct. 4	4	5	8.9
12	4	14	- 0.5	30	1	48	19.4	8	4	16	6.5
16	4	9	+ 0.9	July 4	1	37	20.6	12	4	26	3.9
20	+4	3	+ 2.3	8	-1	26	-21.6	16	+4	33	- 1.3
24	3	55	3.7	12	1	14	22.5	20	4	38	+ 1.4
28	3	46	5.0	16	1	1	23.4	24	4	41	4.2
Feb. 1	3	36	6.3	20	0	47	24.1	28	4	40	7.0
5	3	25	7.5	24	0	33	24.7	Nov. 1	4	37	9.8
9	+3	13	+ 8.7	28	-0	19	-25.1	5	+4	30	+12.6
13	3	0	9.8	Aug. 1	-0	4	25.4	9	4	20	15.3
17	2	46	10.8	5	+0	11	25.6	13	4	6	17.8
21	2	32	11.8	9	0	27	25.6	17	3	49	20.2
25	2	17	12.7	13	0	43	25.5	21	3	28	22.3
Mar. 1	+2	1	+13.5	17	+0	59	-25.2	25	+3	3	+24.0
5	1	44	14.2	21	1	15	24.7	29	2	36	25.4
9	1	27	14.8	25	1	32	24.1	Dec. 3	2	5	26.3
13	1	9	15.2	29	1	48	23.3	7	1	33	26.7
17	0	51	15.6	Sept. 2	2	5	22.4	11	0	59	26.6
21	+0	32	+15.7	6	+2	21	-21.3	15	+0	25	+26.0
25	+0	14	15.7	10	2	38	20.0	19	-0	10	24.9
29	-0	5	15.5	14	2	54	18.6	23	0	43	23.3
Apr. 2	-0	23	+15.1	18	3	10	17.0	27	1	15	21.3
	.	..	...	22	+3	25	-15.2	31	-1	44	+19.0

DIFFERENTIAL COORDINATES OF SATELLITE VII.

Date.	$\alpha_{VII}-\alpha_{Jup.}$		$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$		$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$		$\delta_{VII}-\delta_{Jup.}$
	m	s	'		m	s	'		m	s	'
Jan. 0	-4	39	+ 7.8	June 18	+1	46	- 2.9	Sept. 26	-4	28	+24.2
4	4	32	8.4	22	1	34	1.7	30	4	39	24.0
8	4	23	8.9	26	1	22	- 0.5	Oct. 4	4	48	23.8
12	4	14	9.3	30	1	8	+ 0.8	8	4	56	23.3
16	4	3	9.6	July 4	0	54	2.2	12	5	3	22.7
20	-3	52	+ 9.8	8	+0	40	+ 3.6	16	-5	7	+21.9
24	3	40	10.0	12	0	25	5.1	20	5	9	20.9
28	3	28	10.1	16	+0	10	6.6	24	5	10	19.8
Feb. 1	3	15	10.0	20	-0	6	8.0	28	5	8	18.5
5	3	1	10.0	24	0	22	9.5	Nov. 1	5	3	17.1
9	-2	47	+ 9.8	28	-0	38	+10.9	5	-4	56	+15.6
13	2	33	9.5	Aug. 1	0	54	12.3	9	4	47	14.0
17	2	19	9.2	5	1	11	13.7	13	4	34	12.2
21	2	4	8.7	9	1	27	15.1	17	4	19	10.4
25	1	49	8.3	13	1	44	16.4	21	4	2	8.5
Mar. 1	-1	34	+ 7.7	17	-2	0	+17.6	25	-3	41	+ 6.5
5	1	20	7.1	21	2	17	18.7	29	3	19	4.6
9	1	4	6.4	25	2	33	19.8	Dec. 3	2	54	2.6
13	0	49	5.7	29	2	49	20.8	7	2	28	+ 0.7
17	0	34	4.9	Sept. 2	3	5	21.7	11	2	0	- 1.1
21	-0	19	+ 4.1	6	-3	20	+22.4	15	-1	31	- 2.9
25	-0	4	3.2	10	3	35	23.1	19	1	1	4.6
29	+0	11	2.3	14	3	50	23.6	23	0	31	6.2
Apr. 2	+0	26	+ 1.3	18	4	4	23.9	27	-0	1	7.7
	.	..	...	22	-4	16	+24.1	31	+0	28	- 9.0



636

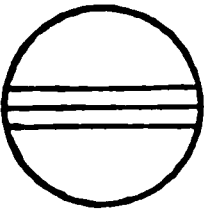
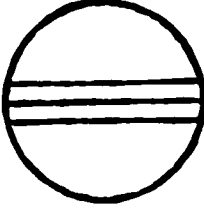
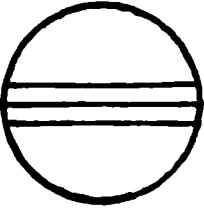
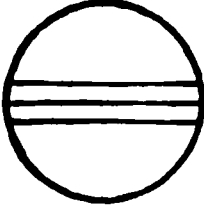
SATELLITES OF JUPITER, 1917.

GREENWICH MEAN TIME.

JANUARY.																			
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	0	22	40	I. Sh. I.	8	13	43	53	II.*Ec. R.	16	10	41	21	III.*Sh. I.	24	2	47	9	I. Sh. E.
	1	15	1	I. Tr. E.		22	18	9	I. Oc. D.		12	20	7	III.*Sh. E.		8	53	48	II. Tr. I.
	2	31	14	I. Sh. E.							21	22	55	I. Tr. I.		11	29	26	II.*Tr. E.
	5	56	51	II. Oc. D.	9	1	4	58	III. Tr. I.		22	42	53	I. Sh. I.		11	36	11	II.*Sh. I.
	8	32	41	II. Oc. R.		1	49	13	I. Ec. R.		23	32	29	I. Tr. E.		14	6	59	II.*Sh. E.
	8	33	57	II. Ec. D.		3	3	13	III. Tr. E.							20	38	40	I. Oc. D.
	11	6	46	II.*Ec. R.		6	38	58	III. Sh. I.	17	0	51	25	I. Sh. E.					
	20	24	11	I. Oc. D.		8	18	15	III. Sh. E.		6	14	48	II. Tr. I.	25	0	9	37	I. Ec. R.
	21	10	56	III. Tr. I.		19	27	55	I. Tr. I.		8	50	19	II. Tr. E.		17	48	7	I. Tr. I.
	23	6	33	III. Tr. E.		20	47	13	I. Sh. I.		8	58	25	II. Sh. I.		19	7	29	I. Sh. I.
	23	53	27	I. Ec. R.		21	37	20	I. Tr. E.		11	29	28	II.*Sh. E.		19	57	53	I. Tr. E.
						22	55	44	I. Sh. E.		18	42	16	I. Oc. D.		21	16	3	I. Sh. E.
2	2	35	59	III. Sh. I.							22	13	56	I. Ec. R.					
	4	15	50	III. Sh. E.	10	3	37	47	II. Tr. I.						26	3	2	19	II. Oc. D.
	17	34	3	I.*Tr. I.		6	13	10	II. Tr. E.	18	15	51	48	I.*Tr. I.		5	39	28	II. Oc. R.
	18	51	35	I. Sh. I.		6	20	30	II. Sh. I.		17	11	46	I. Sh. I.		5	45	0	II. Ec. D.
	19	43	20	I. Tr. E.		8	51	50	II. Sh. E.		18	1	24	I. Tr. E.		8	17	37	II. Ec. R.
	21	0	8	I. Sh. E.		16	46	53	I.*Oc. D.		19	20	18	I. Sh. E.		15	7	52	I.*Oc. D.
						20	18	12	I. Ec. R.							18	38	30	I. Ec. R.
3	1	2	53	II. Tr. I.						19	0	23	34	II. Oc. D.		23	6	18	III. Oc. D.
	3	38	5	II. Tr. E.	11	13	56	32	I.*Tr. I.		3	0	26	II. Oc. R.					
	3	42	24	II. Sh. I.		15	16	5	I.*Sh. I.		3	7	23	II. Ec. D.	27	1	11	43	III. Oc. R.
	6	14	3	II. Sh. E.		16	5	59	I.*Tr. E.		5	40	3	II. Ec. R.		4	41	3	III. Ec. D.
	14	52	37	I.*Oc. D.		17	24	36	I. Sh. E.		13	11	13	I.*Oc. D.		6	22	12	III. Ec. R.
	18	22	27	I. Ec. R.		21	47	3	II. Oc. D.		16	42	49	I.*Ec. R.		12	17	23	I.*Tr. I.
											19	1	2	III. Oc. D.		13	36	28	I.*Sh. I.
4	12	2	23	I.*Tr. I.	12	0	23	33	II. Oc. R.		21	5	3	III. Oc. R.		14	27	12	I.*Tr. E.
	13	20	27	I.*Sh. I.		0	29	53	II. Ec. D.							15	45	3	I.*Sh. E.
	14	11	42	I.*Tr. E.		3	2	37	II. Ec. R.	20	0	38	40	III. Ec. D.		22	14	10	II. Tr. I.
	15	28	59	I.*Sh. E.		11	15	35	I.*Oc. D.		2	20	13	III. Ec. R.					
	19	12	58	II. Oc. D.		14	47	5	I.*Ec. R.		10	20	49	I. Tr. I.	28	0	49	49	II. Tr. E.
	21	49	3	II. Oc. R.		14	59	49	III.*Oc. D.		11	40	45	I.*Sh. I.		0	55	7	II. Sh. I.
	21	52	35	II. Ec. D.		17	2	1	III.*Oc. R.		12	30	29	I.*Tr. E.		3	25	48	II. Sh. E.
						20	35	44	III. Ec. D.		13	49	17	I.*Sh. E.		9	37	12	I. Oc. D.
5	0	25	23	II. Ec. R.		22	17	46	III. Ec. R.		19	34	17	II. Tr. I.		13	7	26	I.*Ec. R.
	9	21	2	I. Oc. D.							22	9	51	II. Tr. E.					
	11	3	59	III.*Oc. D.	13	8	25	17	I. Tr. I.		22	17	29	II. Sh. I.	29	6	46	39	I. Tr. I.
	12	51	20	I.*Ec. R.		9	45	3	I. Sh. I.							8	5	21	I. Sh. I.
	13	3	51	III.*Oc. R.		10	34	47	I. Tr. E.	21	0	48	23	II. Sh. E.		8	56	30	I. Tr. E.
	16	33	24	III.*Ec. D.		11	53	34	I.*Sh. E.		7	40	19	I. Oc. D.		10	13	59	I. Sh. E.
	18	15	56	III. Ec. R.		16	56	18	II.*Tr. I.		11	11	46	I.*Ec. R.		16	22	23	II.*Oc. D.
						19	31	44	II. Tr. E.							18	59	38	II. Oc. R.
6	6	30	51	I. Tr. I.		19	39	40	II. Sh. I.	22	4	49	51	I. Tr. I.		19	3	41	II. Ec. D.
	7	49	24	I. Sh. I.		22	10	50	II. Sh. E.		6	9	38	I. Sh. I.		21	36	16	II. Ec. R.
	8	40	12	I. Tr. E.							6	59	32	I. Tr. E.					
	9	57	56	I. Sh. E.	14	5	44	25	I. Oc. D.		8	18	12	I. Sh. E.	30	4	6	32	I. Oc. D.
	14	20	22	II.*Tr. I.		9	16	3	I. Ec. R.		13	42	35	II.*Oc. D.		7	36	19	I. Ec. R.
	16	55	38	II.*Tr. E.							16	19	35	II.*Oc. R.		13	13	6	III.*Tr. I.
	17	1	42	II.*Sh. I.	15	2	54	3	I. Tr. I.		16	26	2	II.*Ec. D.		15	16	22	III.*Tr. E.
	19	33	10	II. Sh. E.		4	13	56	I. Sh. I.		18	58	39	II. Ec. R.		18	45	35	III. Sh. I.
						5	3	35	I. Tr. E.							20	23	32	III. Sh. E.
7	3	49	35	I. Oc. D.		6	22	28	I. Sh. E.	23	2	9	25	I. Oc. D.					
	7	20	18	I. Ec. R.		11	4	59	II.*Oc. D.		5	40	39	I. Ec. R.	31	1	16	2	I. Tr. I.
						13	41	39	II.*Oc. R.		9	6	10	III. Tr. I.		2	34	20	I. Sh. I.
8	0	59	19	I. Tr. I.		13	48	31	II.*Ec. D.		11	8	13	III.*Tr. E.		3	25	55	I. Tr. E.
	2	18	16	I. Sh. I.		16	21	12	II.*Ec. R.		14	43	32	III.*Sh. I.		4	42	57	I. Sh. E.
	3	8	43	I. Tr. E.							16	21	53	III.*Sh. E.		11	34	35	II.*Tr. I.
	4	26	48	I. Sh. E.	16	0	13	15	I. Oc. D.		23	18	59	I. Tr. I.		14	10	16	II.*Tr. E.
	8	29	41	II. Oc. D.		3	44	57	I. Ec. R.							14	13	44	II.*Sh. I.
	11	5	58	II.*Oc. R.		5	3	20	III. Tr. I.	24	0	38	36	I. Sh. I.		16	44	21	II. Sh. E.
	11	11	9	II.*Ec. D.		7	3	42	III. Tr. E.		1	28	42	I. Tr. E.		22	36	0	I. Oc. D.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation;  
Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

JANUARY.			
<i>Phases of the Eclipses of the Satellites for an Inverting Telescope.</i>			
I.			
II.		IV. No Eclipse.	

<i>Configurations at 14<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.</i>			
Day.	West.		East.
1	4.	•1	○ <sup>s</sup> <sub>2</sub>
2	•4	3.	○ 1. 2.
3	•4	3. 2.	•○1
4	○1.	•4 •3	•2 ○
5		•4	○ <sub>3</sub> •1 •2
6		1. <sup>s</sup> ○	•4 •3
7		•2	○ •1 •4 3.
8		•1	○ •2 3. •4
9		3.	○ 1. 2. •4
10		3. 2. •1	○ 4.
11	○1.	•3 •2	○ 4.
12		•○3	•2 4. •1 ●
13		1. ○2.	<sup>4</sup> <sub>3</sub>
14		2. 4○.	•1 3.
15		4. 1. ○	3. •2 ●
16		4. 3.	○ 1. 2.
17		4. 3. <sup>s</sup> <sub>1</sub>	○
18		4. •3 •2	○1.
19		•4 •3	○ •2 •1 ●
20		•4 1.	○ 2. •3
21		•4 2.	○ •1 •3
22		<sup>1</sup> <sub>4</sub> ○	3. •2 ●
23		3. ○ <sup>1</sup> <sub>4</sub>	2.
24		3. •12.	○ •4
25		•3 •2	○ 1. •4
26		•3 •○1	•2 •4
27	○1.		○ 2. •3 •4
28		2.	○ •1 •3 4.
29		1. •2	○ 3. 4.
30	○3.		○ •1 <sup>4</sup> <sub>2</sub>
31	○2.	3. •1	<sup>4</sup> ○

GREENWICH MEAN TIME.

FEBRUARY.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	2	5	16	I. Ec. R.	9	19	3	47	I. Oc. D.	17	21	32	35	I. Sh. E.	26	15	48	17	I. Sh. I.
	19	45	24	I. Tr. I.		22	29	43	I. Ec. R.							16	52	42	I. Tr. E.
	21	3	13	I. Sh. I.						18	6	23	14	II. Tr. I.		17	57	23	I. Sh. E.
	21	55	20	I. Tr. E.	10	7	28	37	III. Oc. D.		8	46	50	II. Sh. I.					
	23	11	52	I. Sh. E.		9	35	38	III. Oc. R.		8	58	51	II. Tr. E.	27	3	20	6	II. Oc. D.
						12	45	24	III.*Ec. D.		11	17	5	II. Sh. E.		8	7	52	II. Ec. R.
2	5	43	12	II. Oc. D.		14	25	58	III.*Ec. R.		15	32	45	I. Oc. D.		12	2	37	I.*Oc. D.
	8	20	35	II. Oc. R.		16	13	15	I. Tr. I.		18	54	5	I. Ec. R.		15	18	19	I. Ec. R.
	8	22	46	II. Ec. D.		17	27	56	I. Sh. I.										
	10	55	20	II. Ec. R.		18	23	24	I. Tr. E.	19	12	42	12	I.*Tr. I.	28	6	18	15	III. Tr. I.
	17	5	25	I. Oc. D.		19	36	43	I. Sh. E.		13	52	34	I.*Sh. I.		8	23	9	III. Tr. E.
	20	34	8	I. Ec. R.							14	52	35	I.*Tr. E.		9	12	17	I. Tr. I.
					11	3	38	51	II. Tr. I.		16	1	31	I. Sh. E.		10	17	14	I. Sh. I.
3	3	15	59	III. Oc. D.		6	9	48	II. Sh. I.							10	55	18	III. Sh. I.
	5	22	23	III. Oc. R.		6	14	31	II. Tr. E.	20	0	33	15	II. Oc. D.		11	22	51	I. Tr. E.
	8	43	36	III. Ec. D.		8	40	10	II. Sh. E.		5	29	50	II. Ec. R.		12	26	23	I.*Sh. E.
	10	24	27	III. Ec. R.		13	33	31	I.*Oc. D.		10	2	38	I. Oc. D.		12	32	20	III.*Sh. E.
	14	14	54	I.*Tr. I.		16	58	36	I. Ec. R.		13	22	55	I.*Ec. R.		22	31	53	II. Tr. I.
	15	32	12	I.*Sh. I.															
	16	24	52	I. Tr. E.	12	10	42	55	I. Tr. I.	21	1	56	54	III. Tr. I.					
	17	40	52	I. Sh. E.		11	56	50	I.*Sh. I.		4	1	48	III. Tr. E.					
						12	53	7	I.*Tr. E.		6	52	35	III. Sh. I.					
4	0	55	45	II. Tr. I.		14	5	39	I.*Sh. E.		7	12	11	I. Tr. I.					
	3	31	26	II. Tr. E.		21	47	53	II. Oc. D.		8	21	32	I. Sh. I.					
	3	32	33	II. Sh. I.							8	29	43	III. Sh. E.					
	6	3	3	II. Sh. E.	13	2	51	51	II. Ec. R.		9	22	35	I. Tr. E.					
	11	34	58	I.*Oc. D.		8	3	14	I. Oc. D.		10	30	31	I. Sh. E.					
	15	3	3	I.*Ec. R.		11	27	27	I.*Ec. R.		19	45	46	II. Tr. I.					
						21	38	57	III. Tr. I.		22	5	13	II. Sh. I.					
5	8	44	22	I. Tr. I.		23	43	36	III. Tr. E.		22	21	22	II. Tr. E.					
	10	1	5	I. Sh. I.															
	10	54	24	I. Tr. E.	14	2	50	18	III. Sh. I.	22	0	35	25	II. Sh. E.					
	12	9	48	I.*Sh. E.		4	27	36	III. Sh. E.		4	32	37	I. Oc. D.					
	19	4	13	II. Oc. D.		5	12	43	I. Tr. I.		7	51	49	I. Ec. R.					
						6	25	48	I. Sh. I.										
6	0	14	1	II. Ec. R.		7	22	57	I. Tr. E.	23	1	42	5	I. Tr. I.					
	6	4	30	I. Oc. D.		8	34	39	I. Sh. E.		2	50	24	I. Sh. I.					
	9	31	55	I. Ec. R.		17	0	45	II. Tr. I.		3	52	32	I. Tr. E.					
	17	23	57	III. Tr. I.		19	28	16	II. Sh. I.		4	59	25	I. Sh. E.					
	19	28	5	III. Tr. E.		19	36	26	II. Tr. E.		13	56	42	II.*Oc. D.					
	22	47	38	III. Sh. I.		21	58	35	II. Sh. E.		18	49	7	II. Ec. R.					
											23	2	34	I. Oc. D.					
7	0	25	14	III. Sh. E.	15	2	33	4	I. Oc. D.										
	3	13	59	I. Tr. I.		5	56	22	I. Ec. R.	24	2	20	38	I. Ec. R.					
	4	30	4	I. Sh. I.		23	42	27	I. Tr. I.		16	3	21	III. Oc. D.					
	5	24	2	I. Tr. E.							18	10	38	III. Oc. R.					
	6	38	47	I. Sh. E.	16	0	54	41	I. Sh. I.		20	12	9	I. Tr. I.					
	14	16	58	II.*Tr. I.		1	52	44	I. Tr. E.		20	48	43	III. Ec. D.					
	16	51	5	II. Sh. I.		3	3	33	I. Sh. E.		21	19	23	I. Sh. I.					
	16	52	39	II. Tr. E.		11	10	32	II. Oc. D.		22	22	39	I. Tr. E.					
	19	21	32	II. Sh. E.		16	11	5	II. Ec. R.		22	28	49	III. Ec. R.					
						21	2	52	I. Oc. D.		23	28	27	I. Sh. E.					
8	0	34	10	I. Oc. D.															
	4	0	51	I. Ec. R.	17	0	25	13	I. Ec. R.	25	9	8	47	II. Tr. I.					
	21	43	32	I. Tr. I.		11	44	29	III.*Oc. D.		11	23	40	II. Sh. I.					
	22	58	57	I. Sh. I.		13	51	46	III.*Oc. R.		11	44	19	II.*Tr. E.					
	23	53	38	I. Tr. E.		16	47	1	III. Ec. D.		13	53	49	II.*Sh. E.					
						18	12	21	I. Tr. I.		17	32	36	I. Oc. D.					
9	1	7	42	I. Sh. E.		18	27	21	III. Ec. R.		20	49	30	I. Ec. R.					
	8	25	59	II. Oc. D.		19	23	40	I. Sh. I.										
	13	33	9	II.*Ec. R.		20	22	41	I. Tr. E.	26	14	42	10	I.*Tr. I.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation

Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

MEAN TIME.



II.



\*  
r

IV. No Eclipse.



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7

20 7

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29 30

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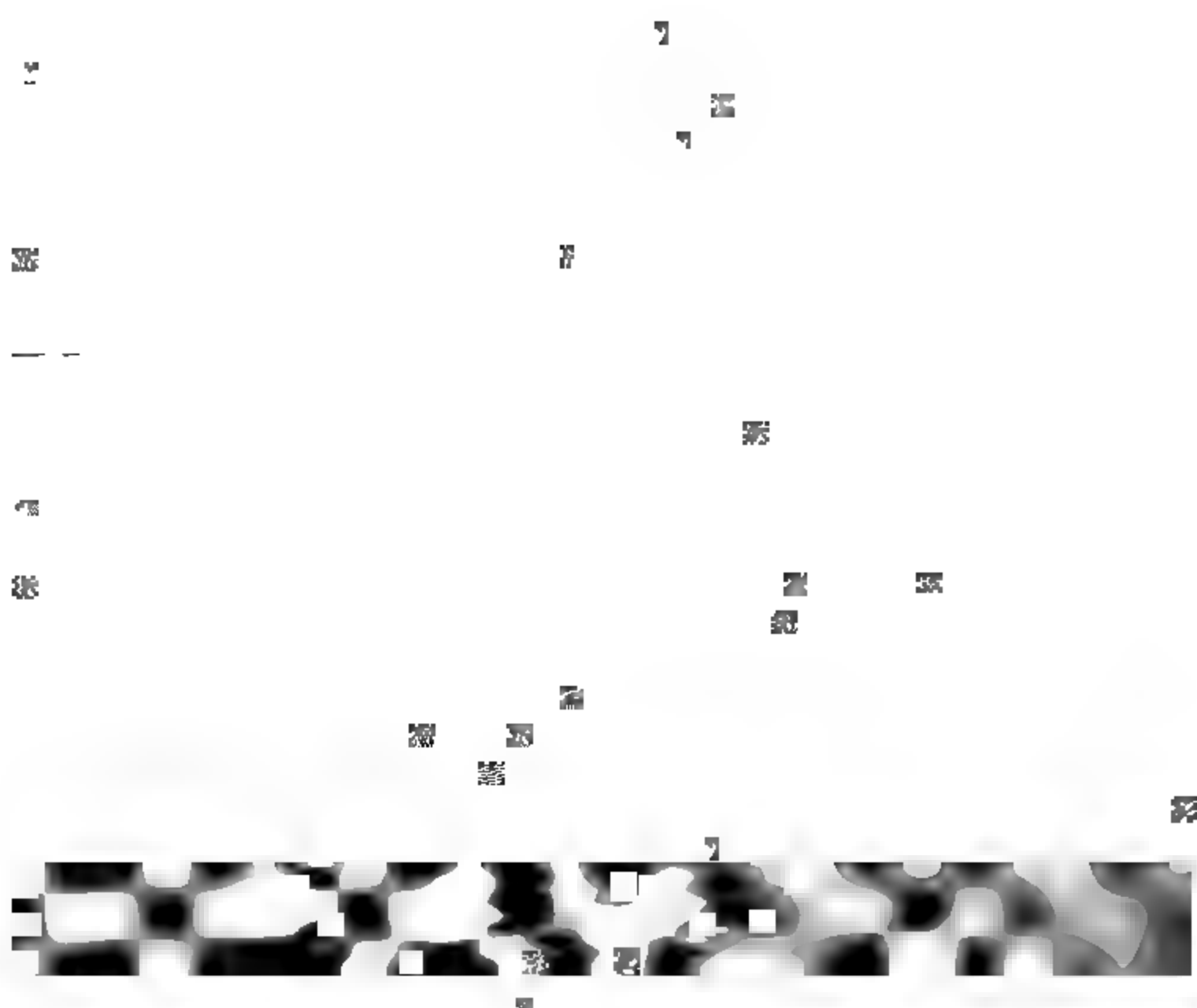
GREENWICH MEAN TIME.

MARCH.

d h m s		d h m s		d h m s		d h m s	
1 0 41 59	II. Sh. I.	9 19 33 8	II. Oc. D.	18 5 15 54	I. Sh. E.	26 4 30 16	I. Ec. R.
1 7 23	II. Tr. E.			7 21 36	III. Oc. R.	22 47 0	I. Tr. I.
3 12 7	II. Sh. E.	10 0 5 26	II. Ec. R.	8 54 40	III. Ec. D.	23 30 48	I. Sh. I.
6 32 44	I. Oc. D.	3 3 30	I. Oc. D.	10 34 23	III. Ec. R.		
9 47 11	I. Ec. R.	6 11 15	I. Ec. R.	17 30 46	II. Tr. I.	27 0 58 5	I. Tr. E.
				19 12 54	II. Sh. I.	1 40 30	I. Sh. E.
2 3 42 20	I. Tr. I.	11 0 13 28	I. Tr. I.	20 5 48	II. Tr. E.	14 39 22	II. Oc. D.
4 46 6	I. Sh. I.	0 49 39	III. Oc. D.	21 42 54	II. Sh. E.	18 40 39	II. Ec. R.
5 52 57	I. Tr. E.	1 10 45	I. Sh. I.	23 34 52	I. Oc. D.	20 6 39	I. Oc. D.
6 55 16	I. Sh. E.	2 24 16	I. Tr. E.			22 59 0	I. Ec. R.
16 44 16	II. Oc. D.	2 56 11	III. Oc. R.	19 2 35 12	I. Ec. R.		
21 27 14	II. Ec. R.	3 20 7	I. Sh. E.	20 45 11	I. Tr. I.	28 17 17 34	I. Tr. I.
		4 52 56	III. Ec. D.	21 35 14	I. Sh. I.	17 59 44	I. Sh. I.
3 1 2 48	I. Oc. D.	6 32 42	III. Ec. R.	22 56 9	I. Tr. E.	19 28 39	I. Tr. E.
4 15 59	I. Ec. R.	14 42 41	II. Tr. I.	23 44 48	I. Sh. E.	20 9 28	I. Sh. E.
20 25 5	III. Oc. D.	16 36 40	II. Sh. I.				
22 12 33	I. Tr. I.	17 17 55	II. Tr. E.	20 11 48 4	II. Oc. D.	29 0 1 47	III. Tr. I.
22 32 5	III. Oc. R.	19 6 42	II. Sh. E.	16 2 23	II. Ec. R.	2 4 42	III. Tr. E.
23 15 5	I. Sh. I.	21 33 44	I. Oc. D.	18 5 11	I. Oc. D.	3 2 22	III. Sh. I.
				21 3 58	I. Ec. R.	4 39 26	III. Sh. E.
4 0 23 12	I. Tr. E.	12 0 40 3	I. Ec. R.			9 43 53	II. Tr. I.
0 50 33	III. Ec. D.	18 43 44	I. Tr. I.	21 15 15 40	I. Tr. I.	11 6 51	II. Sh. I.
1 24 18	I. Sh. E.	19 39 37	I. Sh. I.	16 4 10	I. Sh. I.	12 18 33	II.*Tr. E.
2 30 28	III. Ec. R.	20 54 34	I. Tr. E.	17 26 39	I. Tr. E.	13 36 48	II. Sh. E.
11 55 19	II.*Tr. I.	21 49 2	I. Sh. E.	18 13 46	I. Sh. E.	14 37 6	I. Oc. D.
14 0 17	II.*Sh. I.			19 33 24	III. Tr. I.	17 27 46	I. Ec. R.
14 30 44	II.*Tr. E.	13 8 57 40	II. Oc. D.	21 37 3	III. Tr. E.		
16 30 22	II. Sh. E.	13 24 10	II.*Ec. R.	23 0 47	III. Sh. I.	30 11 48 0	I. Tr. I.
19 32 57	I. Oc. D.	16 3 58	I. Oc. D.			12 28 33	I.*Sh. I.
22 44 49	I. Ec. R.	19 8 50	I. Ec. R.	22 0 37 48	III. Sh. E.	13 59 8	I. Tr. E.
				6 55 0	II. Tr. I.	14 38 19	I. Sh. E.
5 16 42 42	I. Tr. I.	14 13 14 6	I.*Tr. I.	8 30 56	II. Sh. I.		
17 43 58	I. Sh. I.	14 8 34	I. Sh. I.	9 29 56	II. Tr. E.	31 4 5 38	II. Oc. D.
18 53 24	I. Tr. E.	15 6 34	III. Tr. I.	11 0 55	II. Sh. E.	8 0 10	II. Ec. R.
19 53 13	I. Sh. E.	15 24 58	I. Tr. E.	12 35 34	I.*Oc. D.	9 7 30	I. Oc. D.
		16 18 1	I. Sh. E.	15 32 45	I. Ec. R.	11 56 30	I. Ec. R.
6 6 8 18	II. Oc. D.	17 10 50	III. Tr. E.				
10 46 0	II. Ec. R.	18 59 9	III. Sh. I.	23 9 46 2	I. Tr. I.		
14 3 5	I.*Oc. D.	20 36 9	III. Sh. E.	10 33 0	I. Sh. I.		
17 13 37	I. Ec. R.			11 57 4	I.*Tr. E.		
		15 4 6 38	II. Tr. I.	12 42 38	I.*Sh. E.		
7 10 41 27	III. Tr. I.	5 54 49	II. Sh. I.				
11 12 57	I. Tr. I.	6 41 47	II. Tr. E.	24 1 13 58	II. Oc. D.		
12 12 55	I.*Sh. I.	8 24 51	II. Sh. E.	5 21 54	II. Ec. R.		
12 46 7	III.*Tr. E.	10 34 17	I. Oc. D.	7 5 54	I. Oc. D.		
13 23 40	I.*Tr. E.	13 37 39	I.*Ec. R.	10 1 31	I. Ec. R.		
14 22 13	I.*Sh. E.						
14 57 21	III. Sh. I.	16 7 44 23	I. Tr. I.	25 4 16 34	I. Tr. I.		
16 34 21	III. Sh. E.	8 37 24	I. Sh. I.	5 1 57	I. Sh. I.		
		9 55 18	I. Tr. E.	6 27 37	I. Tr. E.		
8 1 18 53	II. Tr. I.	10 46 54	I. Sh. E.	7 11 37	I. Sh. E.		
3 18 29	II. Sh. I.	22 23 4	II. Oc. D.	9 43 39	III. Oc. D.		
3 54 13	II. Tr. E.			11 48 48	III. Oc. R.		
5 48 34	II. Sh. E.	17 2 43 38	II. Ec. R.	12 56 30	III.*Ec. D.		
8 33 19	I. Oc. D.	5 4 33	I. Oc. D.	14 36 14	III. Ec. R.		
11 42 28	I.*Ec. R.	8 6 26	I. Ec. R.	20 19 23	II. Tr. I.		
				21 48 54	II. Sh. I.		
9 5 43 7	I. Tr. I.	18 2 14 50	I. Tr. I.	22 54 11	II. Tr. E.		
6 41 46	I. Sh. I.	3 6 23	I. Sh. I.				
7 53 54	I. Tr. E.	4 25 46	I. Tr. E.	26 0 18 52	II. Sh. E.		
8 51 6	I. Sh. E.	5 15 42	III. Oc. D.	1 36 17	I. Oc. D.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

MEAN TIME.



GREENWICH MEAN TIME.

APRIL.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s			
1	6	18	36	I. Tr. I.	5	19	22	41	I. Ec. R.	11	23	33	22	I. Tr. E.	17	5	17	10	I. Sh. I.		
	6	57	29	I. Sh. I.												7	5	13	I. Tr. E.		
	8	29	45	I. Tr. E.	6	13	50	15	I. Tr. I.	12	0	0	39	I. Sh. E.			7	27	12	I. Sh. E.	
	9	7	17	I. Sh. E.		14	24	2	I. Sh. I.		9	3	1	III. Tr. I.			23	16	55	II. Oc. D.	
	14	12	12	III. Oc. D.		16	1	26	I. Tr. E.		11	4	11	III. Tr. E.							
	16	16	30	III. Oc. R.		16	33	55	I. Sh. E.		11	6	13	III. Sh. I.	18	2	12	3	I. Oc. D.		
	16	57	32	III. Ec. D.							12	43	33	III.*Sh. E.			2	35	22	II. Ec. R.	
	18	37	19	III. Ec. R.	7	6	57	57	II. Oc. D.		15	22	40	II. Tr. I.			4	43	33	I. Ec. R.	
	23	8	28	II. Tr. I.		10	38	26	II. Ec. R.		16	18	9	II. Sh. I.			23	24	41	I. Tr. I.	
						11	9	15	I. Oc. D.		17	56	44	II. Tr. E.			23	46	3	I. Sh. I.	
						13	51	24	I. Ec. R.		18	40	38	I. Oc. D.							
2	0	24	44	II. Sh. I.							18	48	1	II. Sh. E.	19	1	35	56	I. Tr. E.		
	1	43	0	II. Tr. E.							21	17	30	I. Ec. R.			1	56	7	I. Sh. E.	
	2	54	40	II. Sh. E.	8	8	20	54	I. Tr. I.								13	35	12	III. Tr. I.	
	3	37	55	I. Oc. D.		8	52	58	I. Sh. I.								15	8	16	III. Sh. I.	
	6	25	14	I. Ec. R.		10	32	7	I. Tr. E.	13	15	52	41	I. Tr. I.			15	35	26	III. Tr. E.	
						11	2	53	I. Sh. E.		16	19	27	I. Sh. I.			16	45	50	III. Sh. E.	
3	0	49	7	I. Tr. I.		18	41	41	III. Oc. D.		18	3	55	I. Tr. E.			18	12	25	II. Tr. I.	
	1	26	20	I. Sh. I.		20	45	3	III. Oc. R.		18	29	27	I. Sh. E.			18	53	34	II. Sh. I.	
	3	0	17	I. Tr. E.		20	58	22	III. Ec. D.								20	42	33	I. Oc. D.	
	3	36	9	I. Sh. E.		22	38	15	III. Ec. R.	14	9	50	47	II. Oc. D.			20	46	8	II. Tr. E.	
	17	31	21	II. Oc. D.							13	11	7	I. Oc. D.			21	23	23	II. Sh. E.	
	21	18	54	II. Ec. R.	9	1	57	51	II. Tr. I.		13	16	42	II. Ec. R.			23	12	14	I. Ec. R.	
	22	8	20	I. Oc. D.		3	0	22	II. Sh. I.		15	46	12	I. Ec. R.							
						4	32	5	II. Tr. E.												
4	0	53	56	I. Ec. R.		5	30	17	II. Sh. E.	15	10	23	22	I. Tr. I.	20	17	55	15	I. Tr. I.		
	19	19	44	I. Tr. I.		5	39	42	I. Oc. D.		10	48	23	I. Sh. I.			18	14	49	I. Sh. I.	
	19	55	14	I. Sh. I.		8	20	6	I. Ec. R.		12	34	37	I.*Tr. E.			20	6	30	I. Tr. E.	
	21	30	55	I. Tr. E.							12	58	23	I. Sh. E.			20	24	53	I. Sh. E.	
	22	5	6	I. Sh. E.	10	2	51	28	I. Tr. I.		23	12	6	III. Oc. D.							
						3	21	47	I. Sh. I.								21	12	43	58	II. Oc. D.
5	4	32	4	III. Tr. I.		5	2	41	I. Tr. E.	16	2	39	16	III. Ec. R.			15	13	2	I. Oc. D.	
	6	34	8	III. Tr. E.		5	31	43	I. Sh. E.		4	47	30	II. Tr. I.			15	54	54	II. Ec. R.	
	7	4	31	III. Sh. I.		20	23	55	II. Oc. D.		5	35	50	II. Sh. I.			17	40	55	I. Ec. R.	
	8	41	40	III. Sh. E.		23	57	10	II. Ec. R.		7	21	24	II. Tr. E.							
	12	33	9	II.*Tr. I.							7	41	35	I. Oc. D.	22	12	25	58	I. Tr. I.		
	13	42	36	II. Sh. I.	11	0	10	9	I. Oc. D.		8	5	42	II. Sh. E.			12	43	43	I. Sh. I.	
	15	7	32	II. Tr. E.		2	48	47	I. Ec. R.		10	14	52	I. Ec. R.			14	37	13	I. Tr. E.	
	16	12	31	II. Sh. E.		21	22	8	I. Tr. I.								14	53	48	I. Sh. E.	
	16	38	48	I. Oc. D.		21	50	41	I. Sh. I.		17	4	53	58	I. Tr. I.						

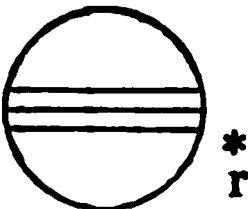
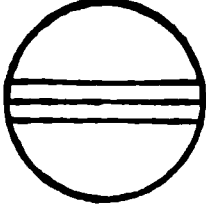
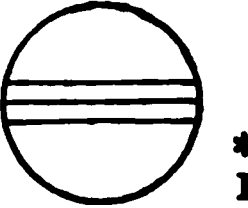
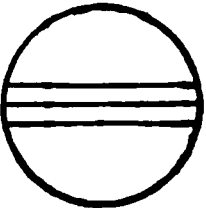
By reason of the proximity of Jupiter to the Sun the phenomena of the satellites are not given from April 23 to May 31.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

APRIL.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.		III.	
II.		IV. No Eclipse.	

Configurations at 12<sup>h</sup> 45<sup>m</sup> for an Inverting Telescope.

Day.	West.				East.			
1			1. •	• 3	2. •		• 4	
2			2. •	•	• 1	• 3		• 4
3			• 1 • 2	•		3. •		• 4
4				•	1. •	• 3		• 4
5	• 2		• 1	•				4. •
6			3. •	• 2	1 •			4. •
7			• 3	•	• 2		4. •	• 1 ●
8				• 3	• 1 • 4		2. •	
9				4. •	• 2	•	• 1 • 3	
10			4. •	• 1	•			• 3
11			4. •		•	1. •	• 3	
12			4. •		• 1 • 3 •	• 2		
13			• 4		3. • 2. •	•	1. •	
14			• 4		• 3	•	• 1	• 2 ●
15				• 4	• 3	1. •	•	2. •
16					• 4	• 3	•	• 1 • 3
17					• 3	• 1	•	• 4 • 3
18					•	• 1	• 3	
19					• 1	•	2. •	• 4
20					3. • 2. •	•	1. •	• 4
21					• 3	• 1	•	4. • • 2 ●
22	• 1			• 3	•	2. •		4. •



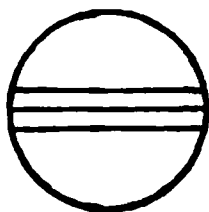
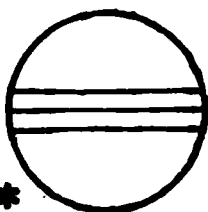
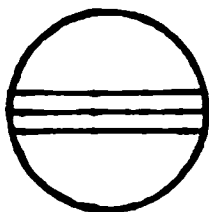
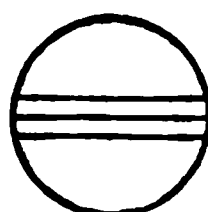
## MEAN TIME.

## JUNE.

d h m s		d h m s		d h m s		d h m s	
1 8 29 21	I. Ec. D.	8 23 11 2	III. Tr. E.	17 10 25 55	II. Ec. D.	26 6 5 47	I. Oc. R.
10 23 29	II. Sh. I.			14 18 53	II. Oc. R.	7 25 17	II. Sh. I.
11 3 8	I. Oc. R.	9 7 40 17	I. Sh. I.			8 59 4	II. Tr. I.
11 10 13	II. Tr. I.	8 11 58	I. Tr. I.	18 4 3 48	I. Sh. I.	9 54 13	II. Sh. E.
12 52 51	II. Sh. E.	9 50 10	I. Sh. E.	4 43 52	I. Tr. I.	11 28 51	II. Tr. E.
13 41 33	II. Tr. E.	10 22 38	I. Tr. E.	6 13 55	I. Sh. E.	17 5 16	III. Ec. D.
15 14 52	III. Sh. I.			8 54 19	I. Tr. E.	18 48 59	III. Ec. R.
16 46 35	III. Tr. I.	10 4 52 2	I. Ec. D.			20 14 50	III. Oc. D.
16 54 22	III. Sh. E.	7 34 32	I. Oc. R.	19 1 14 35	I. Ec. D.	22 8 52	III. Oc. R.
18 41 10	III. Tr. E.	7 48 28	II. Ec. D.	4 5 25	I. Oc. R.		
		11 28 1	II. Oc. R.	6 11 27	II. Sh. I.	27 0 27 5	I. Sh. I.
2 5 45 26	I. Sh. I.			7 19 32	II. Tr. I.	1 15 3	I. Tr. I.
6 10 8	I. Tr. I.	11 2 9 3	I. Sh. I.	8 41 40	II. Sh. E.	2 36 47	I. Sh. E.
7 55 29	I. Sh. E.	2 42 26	I. Tr. I.	13 5 6	III. Ec. D.	3 25 15	I. Tr. E.
8 20 57	I. Tr. E.	4 18 59	I. Sh. E.	14 48 15	III. Ec. R.	21 37 3	I. Ec. D.
		4 53 4	I. Tr. E.	15 48 6	III. Oc. D.		
2 25 7 55	I. Ec. D.	23 20 33	I. Ec. D.	17 42 41	III. Oc. R.	28 0 35 49	I. Oc. R.
5 10 53	II. Ec. D.			22 32 26	I. Sh. I.	2 21 18	II. Ec. D.
5 33 28	I. Oc. R.	12 2 4 44	I. Oc. R.	23 14 7	I. Tr. I.	18 55 48	I. Sh. I.
8 36 32	II. Oc. R.	2 15 43	II. Sh. I.			19 45 17	I. Tr. I.
		3 23 19	II. Tr. I.	20 0 42 15	I. Sh. E.	21 5 28	I. Sh. E.
4 0 14 13	I. Sh. I.	4 44 54	II. Sh. E.	1 24 31	I. Tr. E.	21 55 26	I. Tr. E.
0 40 40	I. Tr. I.	5 55 50	II. Tr. E.	19 43 5	I. Ec. D.		
2 24 15	I. Sh. E.	9 4 16	III. Ec. D.	22 35 33	I. Oc. R.	29 16 5 31	I. Ec. D.
2 51 28	I. Tr. E.	10 40 50	III. Ec. R.	23 44 8	II. Ec. D.	19 5 48	I. Oc. R.
21 26 26	I. Ec. D.	11 19 23	III. Oc. D.			20 42 59	II. Sh. I.
23 40 54	II. Sh. I.	13 14 38	III. Oc. R.	21 3 43 38	II. Oc. R.	22 22 36	II. Tr. I.
		20 37 42	I. Sh. I.	17 1 10	I. Sh. I.	23 11 33	II. Sh. E.
5 0 3 45	I. Oc. R.	21 12 47	I. Tr. I.	17 44 28	I. Tr. I.		
0 34 41	II. Tr. I.	22 47 37	I. Sh. E.	19 10 58	I. Sh. E.	30 0 52 12	II. Tr. E.
2 10 13	II. Sh. E.	23 23 22	I. Tr. E.	19 54 49	I. Tr. E.	7 17 9	III. Sh. I.
3 5 47	II. Tr. E.					8 55 42	III. Sh. E.
5 4 1	III. Ec. D.	12 17 49 3	I. Ec. D.	22 14 11 34	I. Ec. D.	10 29 54	III. Tr. I.
6 46 12	III. Ec. R.	20 34 50	I. Oc. R.	17 5 38	I. Oc. R.	12 31 40	III. Tr. E.
6 50 15	III. Oc. D.	21 6 46	II. Ec. D.	18 7 51	II. Sh. I.	13 24 22	I. Sh. I.
8 46 11	III. Oc. R.			19 35 18	II. Tr. I.	14 15 21	I. Tr. I.
18 42 53	I. Sh. I.	14 0 53 8	II. Oc. R.	20 36 51	II. Sh. E.	15 34 1	I. Sh. E.
19 11 6	I. Tr. I.	15 6 27	I. Sh. I.	22 5 19	II. Tr. E.	16 26 26	I. Tr. E.
20 52 54	I. Sh. E.	15 43 13	I. Tr. I.				
21 21 51	I. Tr. E.	17 16 21	I. Sh. E.	23 3 16 58	III. Sh. I.		
		17 53 45	I. Tr. E.	4 58 0	III. Sh. E.		
16 54 58	I. Ec. D.			6 13 47	III. Tr. I.		
18 29 15	II. Ec. D.	15 12 17 34	I. Ec. D.	8 6 13	III. Tr. E.		
18 34 1	I. Oc. R.	15 5 6	I. Oc. R.	11 29 46	I. Sh. I.		
22 1 56	II. Oc. R.	15 33 5	II. Sh. I.	12 14 39	I. Tr. I.		
		16 47 25	II. Tr. I.	13 39 32	I. Sh. E.		
7 13 11 39	I. Sh. I.	18 2 12	II. Sh. E.	14 24 56	I. Tr. E.		
13 41 36	I. Tr. I.	19 17 53	II. Tr. E.				
15 21 39	I. Sh. E.	23 16 41	III. Sh. I.	24 8 40 5	I. Ec. D.		
15 52 19	I. Tr. E.			11 35 45	I. Oc. R.		
10 23 30	I. Ec. D.	16 0 57 11	III. Sh. E.	13 3 9	II. Ec. D.		
12 58 19	II. Sh. I.	1 46 13	III. Tr. I.	17 8 55	II. Oc. R.		
13 4 16	I. Oc. R.	9 35 4	I. Sh. I.				
13 59 2	II. Tr. I.	10 13 30	I. Tr. I.	25 5 58 28	I. Sh. I.		
15 27 33	II. Sh. E.	11 44 57	I. Sh. E.	6 44 54	I. Tr. I.		
16 29 56	II. Tr. E.	12 23 59	I. Tr. E.	8 8 12	I. Sh. E.		
19 16 6	III. Sh. I.			8 55 9	I. Tr. E.		
20 56 6	III. Sh. E.	17 6 46 5	I. Ec. D.				
21 17 12	III. Tr. I.	9 35 18	I. Oc. R.	26 3 8 34	I. Ec. D.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

JUNE.			
<i>Phases of the Eclipses of the Satellites for an Inverting Telescope.</i>			
I.	<div><div><div>*</div><div>d</div></div></div>	III.	<div><div><div>*</div><div>d</div></div><div><div>*</div><div>r</div></div></div> 
II.	<div><div><div>*</div><div>d</div></div></div>	IV. No Eclipse.	

Configurations at 20 <sup>h</sup> 45 <sup>m</sup> for an Inverting Telescope.	
Day	West. East.
1	4. 2. 3. ○ 1.
2	.4 3. .1 ○
3	.4 .3 ○ 1. .2
4	.4 .3 . ○ 12.
5	○ 1. .3 ○
6	○ .1 .3 .2 ●
7	1. ○ .3
8	2. ○ .1 .4
9	3. .2 .1 ○ .4
10	.3 ○ 1. .2 .4
11	.3 .1 ○ 2. 4.
12	2. 1 ○ .3 4.
13	.1 ○ .3
14	1. ○ 4. .2 3.
15	4. 2. ○ 3. .1
16	4. 3. .21. ○
17	4. 3. ○ .1
18	4. .3 .1 ○ 2.
19	.4 2. ○ .1
20	.4 .2 ○ .3 .1 ●
21	.4 1. ○ .2 3.
22	○ 2. .4 ○ .1
23	.3 .1. ○
24	3. ○ .2 .1 .4
25	.3 .1 ○ 2. .4
26	2. ○ 1. .4 .3 ●
27	.2 .1 ○ .3 .4
28	○ 1. .2 3. 4.
29	○ .1 3. 4.
30	2. .1. ○ 4.

GREENWICH MEAN TIME.

JULY.

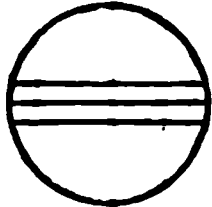
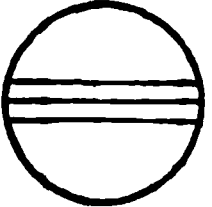
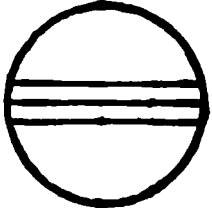
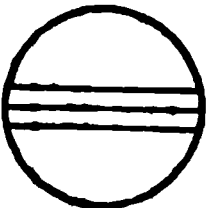
d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	10	34	1	I. Ec. D.	10	10	5	18	I. Oc. R.	18	9	23	46	III. Oc. D.	27	4	42	37	I. Sh. E.
	13	35	49	I. Oc. R.		12	34	56	II. Sh. I.		9	24	25	I. Tr. E.		5	52	33	I. Tr. E.
	15	40	13	II. Ec. D.		14	32	13	II. Tr. I.		11	16	30	III. Oc. R.		23	40	53	I. Ec. D.
	19	58	2	II.*Oc. R.		15	3	39	II. Sh. E.										
						17	1	9	II. Tr. E.	19	3	18	39	I. Ec. D.	28	3	1	54	I. Oc. R.
2	7	53	4	I. Sh. I.							6	34	3	I. Oc. R.		7	2	19	II. Sh. I.
	8	45	29	I. Tr. I.	11	1	4	58	III. Ec. D.		10	11	47	II. Ec. D.		9	23	55	II. Tr. I.
	10	2	40	I. Sh. E.		2	50	1	III. Ec. R.		14	55	49	II. Oc. R.		9	30	49	II. Sh. E.
	10	55	31	I. Tr. E.		4	16	8	I. Sh. I.							11	51	52	II. Tr. E.
						5	2	58	III. Oc. D.	20	0	39	11	I. Sh. I.		21	1	58	I.*Sh. I.
3	5	2	29	I. Ec. D.		5	15	28	I. Tr. I.		1	44	40	I. Tr. I.		22	12	44	I. Tr. I.
	8	5	45	I. Oc. R.		6	25	35	I. Sh. E.		2	48	27	I. Sh. E.		23	11	5	I. Sh. E.
	10	0	5	II. Sh. I.		6	56	6	III. Oc. R.		3	54	11	I. Tr. E.		23	18	26	III. Sh. I.
	11	46	0	II. Tr. I.		7	25	15	I. Tr. E.		21	47	5	I. Ec. D.					
	12	28	55	II. Sh. E.						21	1	3	40	I. Oc. R.	29	0	21	59	I. Tr. E.
	14	15	22	II. Tr. E.	12	1	24	50	I. Ec. D.		4	27	18	II. Sh. I.		1	2	35	III. Sh. E.
	21	5	29	III.*Ec. D.		4	35	7	I. Oc. R.		6	39	59	II. Tr. I.		4	6	11	III. Tr. I.
	22	49	51	III. Ec. R.		7	35	9	II. Ec. D.		6	55	53	II. Sh. E.		5	55	53	III. Tr. E.
						12	9	28	II. Oc. R.		9	8	19	II. Tr. E.		18	9	21	I. Ec. D.
4	0	40	6	III. Oc. D.		22	44	49	I. Sh. I.		19	7	42	I.*Sh. I.	30	2	6	37	II. Ec. D.
	2	21	39	I. Sh. I.		23	45	26	I. Tr. I.		19	18	1	III.*Sh. I.		7	2	56	II. Oc. R.
	2	33	40	III. Oc. R.							20	14	19	I.*Tr. I.		15	30	33	I. Sh. I.
	3	15	31	I. Tr. I.	13	0	54	13	I. Sh. E.		21	1	25	III.*Sh. E.		16	42	15	I. Tr. I.
	4	31	14	I. Sh. E.		1	55	9	I. Tr. E.		21	16	56	I.*Sh. E.		17	39	38	I. Sh. E.
	5	25	30	I. Tr. E.		19	53	16	I.*Ec. D.		22	23	46	I. Tr. E.		18	51	27	I.*Tr. E.
	23	30	57	I. Ec. D.		23	4	52	I. Oc. R.		23	47	53	III. Tr. I.					
										22	1	38	2	III. Tr. E.	31	12	37	47	I. Ec. D.
5	2	35	41	I. Oc. R.	14	1	52	23	II. Sh. I.		16	15	34	I. Ec. D.		16	0	48	I. Oc. R.
	4	58	20	II. Ec. D.		3	55	3	II. Tr. I.	23	16	15	34	I. Ec. D.		20	19	47	II.*Sh. I.
	9	21	55	II. Oc. R.		4	21	3	II. Sh. E.		19	33	20	I.*Oc. R.		22	45	12	II. Tr. I.
	20	50	21	I.*Sh. I.		6	23	48	II. Tr. E.		23	30	19	II. Ec. D.		22	48	16	II. Sh. E.
	21	45	37	I. Tr. I.		15	17	53	III. Sh. I.										
	22	59	53	I. Sh. E.		17	0	36	III. Sh. E.	23	4	18	43	II. Oc. R.					
	23	55	33	I. Tr. E.		17	13	21	I. Sh. I.		13	36	19	I. Sh. I.					
						18	15	14	I. Tr. I.		14	44	1	I. Tr. I.					
6	17	59	25	I. Ec. D.		19	22	43	I.*Sh. E.		15	45	31	I. Sh. E.					
	21	5	34	I.*Oc. R.		19	27	24	III.*Tr. I.		16	53	25	I. Tr. E.					
	23	17	29	II. Sh. I.		20	24	54	I.*Tr. E.										
						21	18	3	III.*Tr. E.										
										24	10	44	0	I. Ec. D.					
7	1	9	11	II. Tr. I.							14	2	53	I. Oc. R.					
	1	46	15	II. Sh. E.	15	14	21	46	I. Ec. D.		17	44	45	II. Sh. I.					
	3	38	22	II. Tr. E.		17	34	40	I. Oc. R.		20	2	0	II.*Tr. I.					
	11	17	14	III. Sh. I.		20	53	48	II.*Ec. D.		20	13	18	II.*Sh. E.					
	12	59	21	III. Sh. E.							22	30	9	II. Tr. E.					
	15	4	17	III. Tr. I.	16	1	33	3	II. Oc. R.										
	15	18	54	I. Sh. I.		11	41	59	I. Sh. I.		25	8	4	51	I. Sh. I.				
	16	15	34	I. Tr. I.		12	45	6	I. Tr. I.			9	3	52	III. Ec. D.				
	16	55	28	III. Tr. E.		13	51	19	I. Sh. E.			9	13	37	I. Tr. I.				
	17	28	25	I. Sh. E.		14	54	43	I. Tr. E.			10	14	1	I. Sh. E.				
	18	25	27	I. Tr. E.								10	50	19	III. Ec. R.				
					17	8	50	12	I. Ec. D.			11	22	57	I. Tr. E.				
8	12	27	55	I. Ec. D.		12	4	22	I. Oc. R.			13	42	40	III. Oc. D.				
	15	35	28	I. Oc. R.		15	9	49	II. Sh. I.			15	34	58	III. Oc. R.				
	18	17	6	II. Ec. D.		17	17	36	II. Tr. I.										
	22	46	8	II. Oc. R.		17	38	26	II. Sh. E.										
						19	46	8	II.*Tr. E.	26	5	12	28	I. Ec. D.					
											8	32	26	I. Oc. R.					
9	9	47	34	I. Sh. I.							12	48	13	II. Ec. D.					
	10	45	34	I. Tr. I.	18	5	4	19	III. Ec. D.			17	40	47	II. Oc. R.				
	11	57	2	I. Sh. E.		6	10	32	I. Sh. I.										
	12	55	23	I. Tr. E.		6	50	4	III. Ec. R.										
						7	14	51	I. Tr. I.	27	2	33	28	I. Sh. I.					
10	6	56	22	I. Ec. D		8	19	51	I. Sh. E.			3	43	15	I. Tr. I.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

JULY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.		III.	
	$\begin{smallmatrix} * \\ d \end{smallmatrix}$		$\begin{smallmatrix} * & * \\ d & r \end{smallmatrix}$
II.		IV. No Eclipse.	
	$\begin{smallmatrix} * \\ d \end{smallmatrix}$		

Configurations at 20<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.

Day.	West.				East.			
1		3.		○	24.	1		
2		.3	$\begin{smallmatrix} 4. \\ 1. \end{smallmatrix}$	○		2.		
3		4.	2.	.3○		1.		
4		4.	.2	.1○		.3		
5		4.		○	1.	.2	.3	
6		.4		○	2.	3.		.1●
7		.4	2.	$\begin{smallmatrix} 3. \\ 1. \end{smallmatrix}$ ○				
8		.4	3.	○	.1			.2●
9		.3	$\begin{smallmatrix} 1. \\ .4 \end{smallmatrix}$	○		2.		
10			$\begin{smallmatrix} 2. \\ 3. \end{smallmatrix}$	○	.4	1.		
11		.2	.1	○	.3	.4		
12				○	1.	.2	.3	.4
13				○	2.	3.	.4	.1●
14	○3.	○1.	2.	○			.4	
15		3.	.2	○	.1		4.	
16		.3	1.	○	.2		4.	
17		.3	2.	○	.1	4.		
18		.2	.1	○	4.	.3		
19		4.		○	$\begin{smallmatrix} 1. \\ 2. \end{smallmatrix}$	.3		
20		4.	.1	○	2.	3.		
21	○1.	4.	2.	○	3.			
22		4.	3.	.2	○	.1		
23		.4	.3	1.	○	.2		
24	○2.	.4	.3	○	.1			
25		.4	.2	1.	○	.3		
26			.4	○	.2	1.	.3	
27			.1	○	.4	2.	3.	
28			2.	○	1.	3.	.4	
29			3.	.2	○		.4	.1●
30		3.	1.	○	.2		.4	
31		.3		○	2.	.1	4.	

GREENWICH MEAN TIME.

AUGUST.

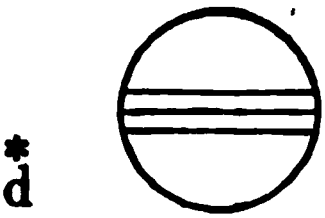
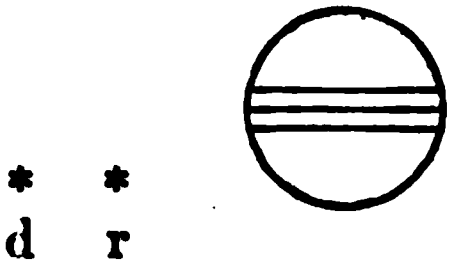
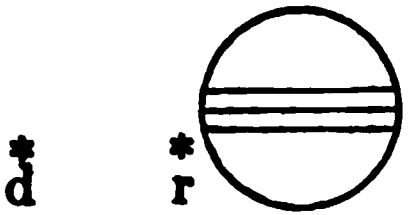
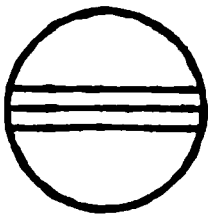
d h m s		d h m s		d h m s		d h m s	
1 113 8	II. Tr. E.	8 22 13 38	III. Oc. D.	16 20 36 21	II.*Ec. D.	24 10 9 41	I. Sh. I.
9 59 4	I. Sh. I.			23 6 50	II. Ec. R.	11 29 54	I. Tr. I.
11 11 40	I. Tr. I.	9 0 5 4	III. Oc. R.	23 17 40	II. Oc. D.	12 18 27	I. Sh. E.
12 8 6	I. Sh. E.	9 0 0	I. Ec. D.			13 38 30	I. Tr. E.
13 3 35	III. Ec. D.	12 27 17	I. Oc. R.	17 1 46 23	II. Oc. R.		
13 20 49	I. Tr. E.	18 0 30	II.*Ec. D.	8 15 46	I. Sh. I.	25 7 15 55	I. Ec. D.
14 50 46	III. Ec. R.	20 31 5	II.*Ec. R.	9 34 31	I. Tr. I.	10 47 50	I. Oc. R.
17 59 13	III. Oc. D.	20 37 5	II.*Oc. D.	10 24 35	I. Sh. E.	17 23 7	II.*Sh. I.
19 51 5	III.*Oc. R.	23 6 13	II. Oc. R.	11 43 16	I. Tr. E.	19 51 37	II.*Sh. E.
						20 6 49	II.*Tr. I.
2 7 6 14	I. Ec. D.	10 6 21 45	I. Sh. I.	18 5 22 9	I. Ec. D.	22 33 31	II. Tr. E.
10 30 12	I. Oc. R.	7 38 14	I. Tr. I.	8 52 32	I. Oc. R.		
15 24 27	II. Ec. D.	8 30 40	I. Sh. E.	14 47 47	II. Sh. I.	26 4 38 6	I. Sh. I.
20 24 17	II.*Oc. R.	9 47 9	I. Tr. E.	17 16 14	II.*Sh. E.	5 58 32	I. Tr. I.
				17 28 20	II.*Tr. I.	6 46 52	I. Sh. E.
3 4 27 39	I. Sh. I.	11 3 28 24	I. Ec. D.	19 55 17	II.*Tr. E.	8 7 8	I. Tr. E.
5 41 7	I. Tr. I.	6 56 24	I. Oc. R.			15 16 36	III. Sh. I.
6 36 41	I. Sh. E.	12 12 32	II. Sh. I.	19 2 44 11	I. Sh. I.	17 4 2	III.*Sh. E.
7 50 13	I. Tr. E.	14 40 58	II. Sh. E.	4 3 23	I. Tr. I.	20 47 17	III.*Tr. I.
		14 48 12	II. Tr. I.	4 53 1	I. Sh. E.	22 34 52	III. Tr. E.
4 1 34 39	I. Ec. D.	17 15 28	II. Tr. E.	6 12 7	I. Tr. E.		
4 59 30	I. Oc. R.			11 17 13	III. Sh. I.	27 1 44 25	I. Ec. D.
9 37 22	II. Sh. I.	12 0 50 12	I. Sh. I.	13 3 45	III. Sh. E.	5 16 34	I. Oc. R.
12 5 50	II. Sh. E.	2 7 20	I. Tr. I.	16 42 5	III. Tr. I.	12 29 56	II. Ec. D.
12 6 41	II. Tr. I.	2 59 6	I. Sh. E.	18 30 16	III.*Tr. E.	15 0 16	II. Ec. R.
14 34 17	II. Tr. E.	4 16 12	I. Tr. E.	23 50 39	I. Ec. D.	15 15 4	II. Oc. D.
22 56 8	I. Sh. I.	7 17 45	III. Sh. I.			17 43 12	II.*Oc. R.
		9 3 28	III. Sh. E.	20 3 21 29	I. Oc. R.	23 6 35	I. Sh. I.
5 0 10 25	I. Tr. I.	12 33 16	III. Tr. I.	9 54 23	II. Ec. D.		
1 5 8	I. Sh. E.	14 22 0	III. Tr. E.	12 24 48	II. Ec. R.	28 0 27 12	I. Tr. I.
2 19 29	I. Tr. E.	21 56 53	I. Ec. D.	12 37 22	II. Oc. D.	1 15 21	I. Sh. E.
3 18 14	III. Sh. I.			15 5 53	II. Oc. R.	2 35 45	I. Tr. E.
5 3 8	III. Sh. E.	13 1 25 33	I. Oc. R.	21 12 42	I.*Sh. I.	20 12 50	I.*Ec. D.
8 21 18	III. Tr. I.	7 18 40	II. Ec. D.	22 32 18	I. Tr. I.	23 45 10	I. Oc. R.
10 10 31	III. Tr. E.	9 49 10	II. Ec. R.	23 21 31	I. Sh. E.		
20 3 8	I.*Ec. D.	9 57 45	II. Oc. D.			29 6 40 42	II. Sh. I.
23 28 50	I. Oc. R.	12 26 40	II. Oc. R.	21 0 40 59	I. Tr. E.	9 9 13	II. Sh. E.
		19 18 45	I.*Sh. I.	18 19 4	I.*Ec. D.	9 25 15	II. Tr. I.
6 4 42 45	II. Ec. D.	20 36 27	I.*Tr. I.	21 50 19	I.*Oc. R.	11 51 49	II. Tr. E.
7 13 22	II. Ec. R.	21 27 37	I.*Sh. E.			17 35 1	I.*Sh. I.
7 16 18	II. Oc. D.	22 45 18	I. Tr. E.	22 4 5 20	II. Sh. I.	18 55 45	I.*Tr. I.
9 45 38	II. Oc. R.			6 33 47	II. Sh. E.	19 43 46	I.*Sh. E.
17 24 42	I. Sh. I.	14 16 25 18	I. Ec. D.	6 47 37	II. Tr. I.	21 4 16	I.*Tr. E.
18 39 45	I.*Tr. I.	19 54 35	I.*Oc. R.	9 14 25	II. Tr. E.		
19 33 40	I.*Sh. E.			15 41 9	I. Sh. I.	30 5 2 26	III. Ec. D.
20 48 45	I.*Tr. E.	15 1 30 4	II. Sh. I.	17 1 5	I.*Tr. I.	6 53 1	III. Ec. R.
		3 58 29	II. Sh. E.	17 49 57	I.*Sh. E.	10 34 37	III. Oc. D.
7 14 31 33	I. Ec. D.	4 8 19	II. Tr. I.	19 9 43	I.*Tr. E.	12 24 34	III. Oc. R.
17 58 3	I.*Oc. R.	6 35 25	II. Tr. E.			14 41 18	I. Ec. D.
22 54 52	II. Sh. I.	13 47 12	I. Sh. I.	23 1 3 20	III. Ec. D.	18 13 46	I.*Oc. R.
		15 5 28	I. Tr. I.	2 53 1	III. Ec. R.		
8 1 23 18	II. Sh. E.	15 56 4	I. Sh. E.	6 31 35	III. Oc. D.	31 1 47 31	II. Ec. D.
1 27 30	II. Tr. I.	17 14 15	I. Tr. E.	8 22 6	III. Oc. R.	4 17 49	II. Ec. R.
3 54 55	II. Tr. E.	21 3 35	III.*Ec. D.	12 47 31	I. Ec. D.	4 33 3	II. Oc. D.
11 53 11	I. Sh. I.	22 52 23	III. Ec. R.	16 19 8	I. Oc. R.	7 1 1	II. Oc. R.
13 8 58	I. Tr. I.			23 12 3	II. Ec. D.	12 3 32	I. Sh. I.
14 2 7	I. Sh. E.	16 2 24 16	III. Oc. D.			13 24 19	I. Tr. I.
15 17 56	I. Tr. E.	4 15 20	III. Oc. R.	24 1 42 26	II. Ec. R.	14 12 16	I. Sh. E.
17 3 54	III. Ec. D.	10 53 45	I. Ec. D.	1 56 23	II. Oc. D.	15 32 48	I. Tr. E.
18 51 52	III.*Ec. R.	14 23 37	I. Oc. R.	4 24 43	II. Oc. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

AUGUST.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.		III.	
II.		IV. No Eclipse.	

Configurations at 19<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.

Day.	West.	East.
1	2. 1. ○	4. 3. ●
2	○	.1 .3 4. 2. ●
3	.1 ○	2.4. 3.
4	2. ○	1. 3.
5	4. 2. 1. ○	
6	○ 1. 4. 3.	○ .2
7	4. .3 ○	.12.
8	4. 2. 1. ○	3
9	.4 ○	.1 .3 2. ●
10	.4 .1 ○	2. 3.
11	.4 2. ○	1. 3.
12	.2 1. ○	
13	3. 1 ○	.4
14	.3 ○	2. .4 1. ●
15	2. 1. ○	.4
16	.2 ○	.1 .3 .4
17	1. ○	.2 .3 4.
18	○ 2.	○ 1. 3. 4.
19	.2 .13. ○	4.
20	3. ○	1.2 4.
21	.3 ○	2. 1. ●
22	4. 2.3 1. ○	
23	4. .2 ○	.1 .3
24	4. 1. ○	.2 .3
25	4. 2 ○	.1 3.
26	.4 .2 .1 3 ○	
27	.4 3. ○	.21.
28	.3 .4 .1 ○	2.
29	○ 1. .32. .4 ○	
30	.2 ○	.1 .3 .4
31	1. ○	.2 .3 .4

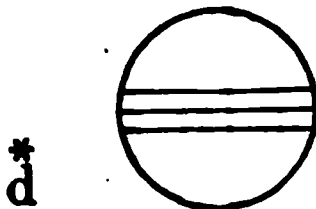
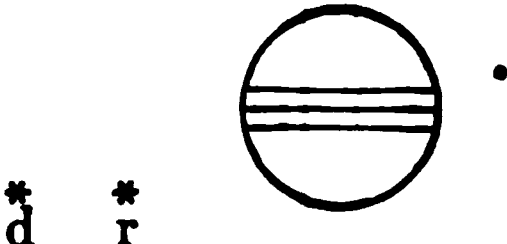
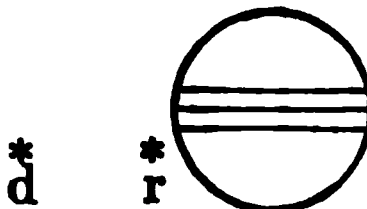
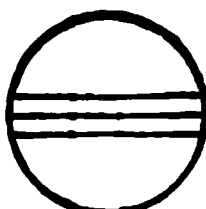
GREENWICH MEAN TIME.

SEPTEMBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	9	9	42	I. Ec. D.	9	8	25	41	I. Sh. I.	17	7	25	52	I. Ec. D.	25	1	24	2	II. Oc. D.
	12	42	14	I. Oc. R.		9	45	53	I. Tr. I.		8	39	52	III. Tr. I.		3	50	47	II. Oc. R.
	19	58	36	II.*Sh. I.		10	34	26	I. Sh. E.		10	25	30	III. Tr. E.		6	41	24	I. Sh. I.
	22	27	10	II. Sh. E.		11	54	17	I. Tr. E.		10	56	5	I. Oc. R.		7	56	25	I. Tr. I.
	22	43	39	II. Tr. I.		23	16	4	III. Sh. I.		20	15	37	II.*Ec. D.		8	50	20	I. Sh. E.
											22	45	42	II. Ec. R.		10	4	48	I. Tr. E.
											22	55	16	II. Oc. D.					
2	1	10	7	II. Tr. E.	10	1	5	26	III. Sh. E.						26	3	48	14	I. Ec. D.
	6	31	56	I. Sh. I.		4	46	39	III. Tr. I.							7	14	42	I. Oc. R.
	7	52	44	I. Tr. I.		5	32	1	I. Ec. D.	18	1	22	20	II. Oc. R.					
	8	40	40	I. Sh. E.		6	32	57	III. Tr. E.		4	47	47	I. Sh. I.		17	3	23	II.*Sh. I.
	10	1	12	I. Tr. E.		9	3	56	I. Oc. R.		6	5	47	I. Tr. I.		19	32	35	II.*Sh. E.
	19	16	35	III.*Sh. I.		17	40	33	II.*Ec. D.		6	56	37	I. Sh. E.		19	36	30	II.*Tr. I.
	21	4	56	III.*Sh. E.		20	10	42	II.*Ec. R.		8	14	8	I. Tr. E.		22	2	30	II.*Tr. E.
						20	24	7	II.*Oc. D.										
						22	51	31	II. Oc. R.	19	1	54	19	I. Ec. D.	27	1	9	47	I. Sh. I.
3	0	49	17	III. Tr. I.							5	23	55	I. Oc. R.		2	23	52	I. Tr. I.
	2	36	14	III. Tr. E.							14	27	31	II. Sh. I.		3	18	45	I. Sh. E.
	3	38	12	I. Ec. D.	11	2	54	7	I. Sh. I.		16	56	29	II.*Sh. E.		4	32	15	I. Tr. E.
	7	10	45	I. Oc. R.		4	14	0	I. Tr. I.		17	6	53	II.*Tr. I.		21	0	32	III.*Ec. D.
	15	5	18	II. Ec. D.		5	2	53	I. Sh. E.		19	32	57	II.*Tr. E.		22	16	46	I.*Ec. D.
	17	35	32	II.*Ec. R.		6	22	24	I. Tr. E.		23	16	10	I. Sh. I.		22	54	57	III. Ec. R.
	17	50	40	II.*Oc. D.															
	20	18	26	II.*Oc. R.	12	0	0	27	I. Ec. D.										
						3	32	2	I. Oc. R.	20	0	33	31	I. Tr. I.	28	1	42	15	I. Oc. R.
4	1	0	23	I. Sh. I.		11	51	46	II. Sh. I.		1	25	2	I. Sh. E.		2	6	33	III. Oc. D.
	2	21	7	I. Tr. I.		14	20	32	II. Sh. E.		2	41	53	I. Tr. E.		3	53	29	III. Oc. R.
	3	9	8	I. Sh. E.		14	35	1	II. Tr. I.		17	0	18	III.*Ec. D.		12	7	57	II. Ec. D.
	4	29	35	I. Tr. E.		17	1	12	II.*Tr. E.		18	53	43	III.*Ec. R.		17	4	8	II.*Oc. R.
	22	6	37	I.*Ec. D.		21	22	31	I.*Sh. I.		20	22	49	I.*Ec. D.		19	38	13	I.*Sh. I.
						22	42	2	I. Tr. I.		22	19	44	III.*Oc. D.		20	51	19	I.*Tr. I.
5	1	39	6	I. Oc. R.		23	31	18	I. Sh. E.		23	51	45	I. Oc. R.		21	47	13	I.*Sh. E.
	9	16	11	II. Sh. I.												22	59	42	I. Tr. E.
	11	44	48	II. Sh. E.	13	0	50	24	I. Tr. E.	21	0	7	31	III. Oc. R.					
	12	1	7	II. Tr. I.		13	0	46	III. Ec. D.		9	33	2	II. Ec. D.	29	16	45	11	I.*Ec. D.
	14	27	28	II. Tr. E.		14	53	13	III. Ec. R.		12	3	6	II. Ec. R.		20	9	38	I.*Oc. R.
	19	28	48	I.*Sh. I.		18	28	53	III.*Oc. D.		12	9	54	II. Oc. D.					
	20	49	25	I.*Tr. I.		18	28	56	I.*Ec. D.		14	36	50	II. Oc. R.	30	6	21	39	II. Sh. I.
	21	37	33	I.*Sh. E.		20	17	28	III.*Oc. R.		17	44	37	I.*Sh. I.		8	50	48	II. Tr. I.
	22	57	51	I. Tr. E.		22	0	9	I.*Oc. R.		19	1	15	I.*Tr. I.		8	51	0	II. Sh. E.
											19	53	30	I.*Sh. E.		11	16	49	II. Tr. E.
6	9	1	27	III. Ec. D.	14	6	58	0	II. Ec. D.		21	9	37	I.*Tr. E.		14	6	36	I. Sh. I.
	10	52	58	III. Ec. R.		9	28	9	II. Ec. R.							15	18	38	I.*Tr. I.
	14	33	40	III. Oc. D.		9	39	57	II. Oc. D.	22	14	51	14	I. Ec. D.		16	15	38	I.*Sh. E.
	16	22	59	III.*Oc. R.		12	7	11	II. Oc. R.		18	19	25	I.*Oc. R.		17	27	2	I.*Tr. E.
	16	35	6	I.*Ec. D.		15	50	59	I.*Sh. I.										
	20	7	28	I.*Oc. R.		17	10	3	I.*Tr. I.	23	3	45	41	II. Sh. I.					
						17	59	46	I.*Sh. E.		6	14	46	II. Sh. E.					
7	4	22	51	II. Ec. D.		19	18	26	I.*Tr. E.		6	22	16	II. Tr. I.					
	6	53	3	II. Ec. R.							8	48	19	II. Tr. E.					
	7	7	37	II. Oc. D.	15	12	57	20	I. Ec. D.		12	12	59	I. Sh. I.					
	9	35	13	II. Oc. R.		16	28	5	I.*Oc. R.		13	28	51	I. Tr. I.					
	13	57	18	I. Sh. I.							14	21	54	I. Sh. E.					
	15	17	43	I. Tr. I.	16	1	9	52	II. Sh. I.		15	37	13	I.*Tr. E.					
	16	6	2	I.*Sh. E.		3	38	44	II. Sh. E.										
	17	26	8	I.*Tr. E.		3	51	30	II. Tr. I.	24	7	15	5	III. Sh. I.					
						6	17	38	II. Tr. E.		9	6	39	III. Sh. E.					
8	11	3	30	I. Ec. D.		10	19	21	I. Sh. I.		9	19	47	I. Ec. D.					
	14	35	40	I. Oc. R.		11	37	56	I. Tr. I.		12	27	57	III. Tr. I.					
	22	34	10	II. Sh. I.		12	28	10	I. Sh. E.		12	47	9	I. Oc. R.					
						13	46	18	I. Tr. E.		14	12	52	III. Tr. E.					
9	1	2	51	II. Sh. E.							22	50	34	II. Ec. D.					
	1	18	35	II. Tr. I.	17	3	15	50	III. Sh. I.										
	3	44	51	II. Tr. E.		5	6	18	III. Sh. E.	25	1	20	35	II. Ec. R.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

SEPTEMBER.			
<i>Phases of the Eclipses of the Satellites for an Inverting Telescope.</i>			
I.		III.	
II.		IV. No Eclipse.	

<i>Configurations at 19<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.</i>	
Day.	West. East.
1	○ 2. 1 3. 4
2	2. 1. ○ 3. 4
3	3. ○ 1. 4. 2●
4	3. .1 ○ 2. 4.
5	.3 2. ○ 1. 4.
6	.2 ○ .3 4. 1●
7	.1. ○ .2 .3
8	4. ○ .1 3.
9	4. 2. 1. ○ 3.
10	4. 3. ○ 1. 2●
11	.4 3. .1 ○ 2.
12	.4 .3 2. ○ 1.
13	.4 .2 ○ 1● .3●
14	○ 1. .4 ○ .2 .3
15	○ .1 2. 3.
16	2. 1. ○ 3. 4
17	3. .2 ○ .1 4
18	3. .1 ○ .2 4
19	○ 2. .3 ○ 1. 4
20	.2 .1. ○ 4.
21	1 ○ . 2 .3 4.
22	○ .1 2. 4. 3.
23	2. 1. ○ 4. 3.
24	4. .3. ○ .1
25	4. 3. 1. ○ .2
26	4. .3 2 ○ . 1.
27	4. .2 .1. ○
28	.4 ○ .1. 3
29	.4 ○ 2. 3 1●
30	.4 2. 1. ○ 3.



GREENWICH MEAN TIME.

OCTOBER.

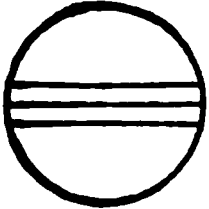
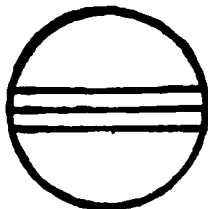
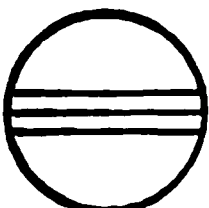
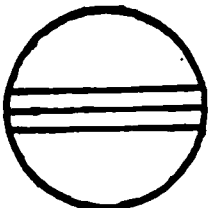
d h m s		d h m s		d h m s		d h m s	
1 11 13 45	I. Ec. D.	9 11 34 15	I. Tr. I.	18 5 17 58	II. Tr. E.	26 16 22 2	III.*Oc. D.
11 14 6	III. Sh. I.	12 37 49	I. Sh. E.	6 50 34	I. Sh. I.	18 6 12	III.*Oc. R.
13 6 51	III. Sh. E.	13 42 44	I. Tr. E.	7 48 3	I. Tr. I.	22 26 48	II.*Ec. D.
14 37 5	I.*Oc. R.			9 0 2	I. Sh. E.		
16 11 9	III.*Tr. I.	10 7 36 17	I. Ec. D.	9 56 40	I. Tr. E.	27 2 29 51	II. Oc. R.
17 55 19	III.*Tr. E.	10 52 53	I. Oc. R.			3 12 41	I. Sh. I.
		22 15 36	II.*Sh. I.	19 3 59 3	I. Ec. D.	4 0 17	I. Tr. I.
2 1 25 23	II. Ec. D.			7 7 4	I. Oc. R.	5 22 23	I. Sh. E.
6 16 52	II. Oc. R.	11 0 28 58	II. Tr. I.	8 59 10	III. Ec. D.	6 9 2	I. Tr. E.
8 35 0	I. Sh. I.	0 45 22	II. Sh. E.	10 56 49	III. Ec. R.		
9 45 54	I. Tr. I.	2 55 2	II. Tr. E.	12 55 24	III. Oc. D.	28 0 21 51	I. Ec. D.
10 44 4	I. Sh. E.	4 56 57	I. Sh. I.	14 40 9	III.*Oc. R.	3 19 34	I. Oc. R.
11 54 20	I. Tr. E.	6 1 8	I. Tr. I.	19 52 10	II.*Ec. D.	16 47 18	II.*Sh. I.
		7 6 14	I. Sh. E.			18 22 26	II.*Tr. I.
3 5 42 13	I. Ec. D.	8 9 38	I. Tr. E.	20 0 11 45	II. Oc. R.	19 17 54	II.*Sh. E.
9 4 21	I. Oc. R.			1 19 1	I. Sh. I.	20 48 55	II.*Tr. E.
19 39 25	II.*Sh. I.	12 2 4 52	I. Ec. D.	2 14 39	I. Tr. I.	21 41 6	I.*Sh. I.
22 3 54	II.*Tr. I.	4 59 57	III. Ec. D.	3 28 31	I. Sh. E.	22 26 33	I.*Tr. I.
22 8 54	II.*Sh. E.	5 19 54	I. Oc. R.	4 23 17	I. Tr. E.	23 50 51	I. Sh. E.
		6 56 30	III. Ec. R.	22 27 32	I.*Ec. D.		
4 0 29 54	II. Tr. E.	9 24 19	III. Oc. D.			29 0 35 20	I. Tr. E.
3 3 22	I. Sh. I.	11 9 40	III. Oc. R.	21 1 33 38	I. Oc. R.	18 50 31	I.*Ec. D.
4 13 5	I. Tr. I.	17 17 30	II.*Ec. D.	14 10 36	II.*Sh. I.	21 45 58	I.*Oc. R.
5 12 29	I. Sh. E.	21 51 32	II.*Oc. R.	16 2 47	II.*Tr. I.		
6 21 30	I. Tr. E.	23 25 24	I. Sh. I.	16 40 53	II.*Sh. E.	30 3 11 30	III. Sh. I.
				18 29 3	II.*Tr. E.	5 9 12	III. Sh. E.
5 0 10 46	I. Ec. D.	13 0 28 0	I. Tr. I.	19 47 25	I.*Sh. I.	6 17 17	III. Tr. I.
1 0 10	III. Ec. D.	1 34 43	I. Sh. E.	20 41 9	I.*Tr. I.	7 59 18	III. Tr. E.
2 55 38	III. Ec. R.	2 36 31	I. Tr. E.	21 56 58	I.*Sh. E.	11 44 6	II. Ec. D.
3 31 38	I. Oc. R.	20 33 20	I.*Ec. D.	22 49 48	I.*Tr. E.	15 38 10	II.*Oc. R.
5 47 52	III. Oc. D.	23 46 43	I. Oc. R.			16 9 32	I.*Sh. I.
7 33 58	III. Oc. R.			22 16 56 10	I.*Ec. D.	16 52 45	I.*Tr. I.
14 42 45	II.*Ec. D.	14 11 34 5	II. Sh. I.	20 0 16	I.*Oc. R.	18 19 20	I.*Sh. E.
19 29 0	II.*Oc. R.	13 41 2	II.*Tr. I.	23 12 5	III. Sh. I.	19 1 34	I.*Tr. E.
21 31 48	I.*Sh. I.	14 4 2	II.*Sh. E.				
22 40 14	I. Tr. I.	16 7 9	II.*Tr. E.	23 1 8 30	III. Sh. E.	31 13 19 5	I.*Ec. D.
23 40 57	I. Sh. E.	17 53 47	I.*Sh. I.	2 52 38	III. Tr. I.	16 12 13	I.*Oc. R.
		18 54 45	I.*Tr. I.	4 34 54	III. Tr. E.		
6 0 48 40	I. Tr. E.	20 3 9	I.*Sh. E.	9 9 27	II. Ec. D.		
18 39 13	I.*Ec. D.	21 3 18	I.*Tr. E.	13 21 1	II.*Oc. R.		
21 58 44	I.*Oc. R.			14 15 49	I.*Sh. I.		
		15 15 1 56	I.*Ec. D.	15 7 35	I.*Tr. I.		
7 8 57 48	II. Sh. I.	18 13 37	I.*Oc. R.	16 25 26	I.*Sh. E.		
11 17 4	II. Tr. I.	19 12 18	III.*Sh. I.	17 16 16	I.*Tr. E.		
11 27 26	II. Sh. E.	21 7 27	III.*Sh. E.				
13 43 7	II. Tr. E.	23 23 9	III. Tr. I.	24 11 24 43	I. Ec. D.		
16 0 11	I.*Sh. I.			14 26 44	I.*Oc. R.		
17 7 16	I.*Tr. I.	16 1 5 55	III. Tr. E.				
18 9 22	I.*Sh. E.	6 34 49	II. Ec. D.	25 3 28 32	II. Sh. I.		
19 15 44	I.*Tr. E.	11 1 54	II. Oc. R.	5 12 26	II. Tr. I.		
		12 22 11	I. Sh. I.	5 58 58	II. Sh. E.		
8 13 7 48	I. Ec. D.	13 21 27	I. Tr. I.	7 38 47	II. Tr. E.		
15 13 12	III.*Sh. I.	14 31 36	I.*Sh. E.	8 44 13	I. Sh. I.		
16 25 54	I.*Oc. R.	15 30 2	I.*Tr. E.	9 33 56	I. Tr. I.		
17 7 8	III.*Sh. E.			10 53 53	I. Sh. E.		
19 49 37	III.*Tr. I.	17 9 30 27	I. Ec. D.	11 42 40	I. Tr. E.		
21 33 2	III.*Tr. E.	12 40 20	I. Oc. R.				
				26 5 53 20	I. Ec. D.		
9 4 0 8	II. Ec. D.	18 0 51 58	II. Sh. I.	8 53 14	I. Oc. R.		
8 40 32	II. Oc. R.	2 51 47	II. Tr. I.	12 58 26	III.*Ec. D.		
10 28 35	I. Sh. I.	3 22 4	II. Sh. E.	14 57 11	III.*Ec. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \* Visible at Washington.

GREENWICH MEAN TIME.

OCTOBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		III.	
II.		IV. No Eclipse.	

*Configurations at 18<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		<sup>3</sup> ○ <sup>1</sup>
2	3.	1. ○ 4. 2.
3	.3	○ 2. 1. 4.
4	2. <sup>3</sup> <sup>1</sup>	○ 4.
5		○ 1. 3. 4. 2●
6		.1 ○ 2. 3. 4.
7	○ 1.	2. ○ 3. 4.
8		.2 3 ○ .1 4.
9	3.	1. ○ 2 4.
10	.3	<sup>4</sup> ○ <sup>3</sup> <sup>1</sup>
11		<sup>4</sup> <sup>3</sup> <sup>1</sup> ○
12	4.	○ <sup>1</sup> <sup>3</sup> 2●
13	4.	.1 ○ 2. 3.
14	4.	2.1 ○ . 3.
15	.4	.2 ○ 3. <sup>1</sup>
16	.4	3. 1. ○ .2
17	3. 4.	○ <sup>1</sup> <sup>3</sup>
18	<sup>3</sup> <sup>1</sup> .4	○
19		.2 ○ 3 <sup>1</sup> <sup>4</sup>
20		.1 ○ .2 3. 4.
21	○ 2.	○ 1. 3. 4.
22		.2 ○ . 3. 4. 1●
23	3.	1. ○ 2. 4.
24	3.	○ .1 2. 4.
25	.3 2.1.	○ 4.
26		.2 ○ <sup>4</sup> <sup>1</sup>
27		<sup>4</sup> <sup>1</sup> ○ .2 3.
28	4.	○ <sup>3</sup> 1. 3.
29	4.	.2 . ○ 1 3.
30	○ 1.	4. 3. ○ .2
31	.4	3. ○ .1 2.

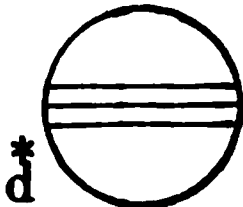
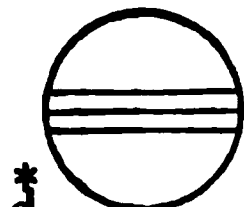
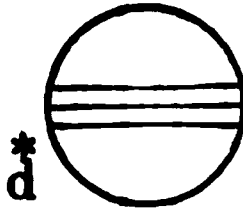
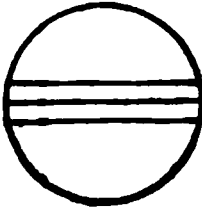
GREENWICH MEAN TIME.

NOVEMBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	6	5	19	II. Sh. I.	9	20	58	7	III.*Ec. D.	18	8	32	57	I. Oc. R.	27	19	9	48	III.*Sh. I.
	7	31	8	II. Tr. I.		22	59	7	III.*Ec. R.							19	24	42	III.*Tr. I.
	8	36	4	II. Sh. E.		23	4	27	III.*Oc. D.	19	0	38	48	II. Sh. I.		21	9	17	III.*Tr. E.
	9	57	44	II. Tr. E.							1	11	52	II. Tr. I.		21	12	36	III.*Sh. E.
	10	37	57	I. Sh. I.	10	0	48	28	III. Oc. R.		3	10	11	II. Sh. E.		22	2	53	II.*Ec. D.
	11	18	54	I. Tr. I.		3	36	3	II. Ec. D.		3	22	49	I. Sh. I.		23	45	34	I. Sh. I.
	12	47	48	I.*Sh. E.		7	0	18	I. Sh. I.		3	38	19	I. Tr. I.		23	47	14	I. Tr. I.
	13	27	45	I.*Tr. E.		7	0	48	II. Oc. R.		3	39	19	II. Tr. E.					
						7	29	2	I. Tr. I.		5	33	2	I. Sh. E.	28	0	33	41	II. Oc. R.
2	7	47	45	I. Ec. D.		9	10	21	I. Sh. E.		5	47	27	I. Tr. E.		1	55	54	I. Sh. E.
	10	38	31	I. Oc. R.		9	38	2	I. Tr. E.							1	56	29	I. Tr. E.
	16	58	7	III.*Ec. D.						20	0	34	19	I. Ec. D.		20	57	53	I.*Ec. D.
	18	58	0	III.*Ec. R.	11	4	10	52	I. Ec. D.		2	58	56	I. Oc. R.		23	9	18	I.*Ec. R.
	19	44	56	III.*Oc. D.		6	49	2	I. Oc. R.		15	10	9	III.*Sh. I.					
	21	28	51	III.*Oc. R.		22	1	24	II.*Sh. I.		16	10	51	III.*Tr. I.	29	16	33	24	II.*Tr. I.
						22	56	38	II.*Tr. I.		17	11	44	III.*Sh. E.		16	34	54	II.*Sh. I.
3	1	1	26	II. Ec. D.							17	54	12	III.*Tr. E.		18	13	0	I.*Tr. I.
	4	46	6	II. Oc. R.	12	0	32	34	II. Sh. E.		19	28	6	II.*Ec. D.		18	14	8	I.*Sh. I.
	5	6	26	I. Sh. I.		1	23	42	II. Tr. E.		21	51	21	I.*Sh. I.		19	1	27	II.*Tr. E.
	5	45	2	I. Tr. I.		1	28	47	I. Sh. I.		22	4	6	I.*Tr. I.		19	6	32	II.*Sh. E.
	7	16	19	I. Sh. E.		1	54	57	I. Tr. I.		22	20	53	II.*Oc. R.		20	22	17	I.*Tr. E.
	7	53	54	I. Tr. E.		3	38	52	I. Sh. E.							20	24	29	I.*Sh. E.
						4	3	59	I. Tr. E.	21	0	1	36	I. Sh. E.					
4	2	16	18	I. Ec. D.		22	39	35	I.*Ec. D.		0	13	16	I. Tr. E.	30	15	24	4	I.*Oc. D.
	5	4	39	I. Oc. R.							19	2	59	I.*Ec. D.		17	38	8	I.*Ec. R.
	19	24	14	II.*Sh. I.	13	1	15	7	I. Oc. R.		21	24	49	I.*Oc. R.					
	20	40	17	II.*Tr. I.		11	10	44	III. Sh. I.										
	21	55	8	II.*Sh. E.		12	55	49	III.*Tr. I.	22	13	57	9	II.*Sh. I.					
	23	7	2	II.*Tr. E.		13	11	3	III.*Sh. E.		14	18	49	II.*Tr. I.					
	23	34	53	I. Sh. I.		14	38	21	III.*Tr. E.		16	19	52	I.*Sh. I.					
						16	53	24	II.*Ec. D.		16	28	39	II.*Sh. E.					
5	0	11	6	I. Tr. I.		19	57	17	I.*Sh. I.		16	29	52	I.*Tr. I.					
	1	44	49	I. Sh. E.		20	7	41	II.*Oc. R.		16	46	27	II.*Tr. E.					
	2	20	1	I. Tr. E.		20	20	49	I.*Tr. I.		18	30	8	I.*Sh. E.					
	20	44	59	I.*Ec. D.		22	7	24	I.*Sh. E.		18	39	4	I.*Tr. E.					
	23	30	52	I. Oc. R.		22	29	53	I.*Tr. E.										
										23	13	31	45	I.*Ec. D.					
6	7	11	18	III. Sh. I.	14	17	8	13	I.*Ec. D.		15	50	47	I.*Oc. R.					
	9	10	20	III. Sh. E.		19	41	3	I.*Oc. R.										
	9	38	22	III. Tr. I.						24	4	59	9	III. Ec. D.					
	11	20	28	III. Tr. E.	15	11	19	38	II.*Sh. I.		7	22	24	III. Oc. R.					
	14	18	44	II.*Ec. D.		12	3	54	II.*Tr. I.		8	45	30	II. Ec. D.					
	17	53	36	II.*Oc. R.		13	50	55	II.*Sh. E.		10	48	27	I.*Sh. I.					
	18	3	21	I.*Sh. I.		14	25	46	I.*Sh. I.		10	55	40	I.*Tr. I.					
	18	37	6	I.*Tr. I.		14	31	9	II.*Tr. E.		11	27	18	II.*Oc. R.					
	20	13	19	I.*Sh. E.		14	46	39	I.*Tr. I.		12	58	44	I.*Sh. E.					
	20	46	3	I.*Tr. E.		16	35	54	I.*Sh. E.		13	4	53	I.*Tr. E.					
						16	55	44	I.*Tr. E.										
7	15	13	35	I.*Ec. D.						25	8	0	24	I. Ec. D.					
	17	56	56	I.*Oc. R.	16	11	36	57	I.*Ec. D.		10	16	38	I. Oc. R.					
						14	7	4	I.*Oc. R.										
8	8	42	22	II. Sh. I.						26	3	16	29	II. Sh. I.					
	9	48	11	II. Tr. I.	17	0	58	54	III. Ec. D.		3	26	34	II. Tr. I.					
	11	13	24	II. Sh. E.		4	6	25	III. Oc. R.		5	17	1	I. Sh. I.					
	12	15	5	II.*Tr. E.		6	10	46	II. Ec. D.		5	21	28	I. Tr. I.					
	12	31	48	I.*Sh. I.		8	54	18	I. Sh. I.		5	48	2	II. Sh. E.					
	13	3	4	I.*Tr. I.		9	12	30	I. Tr. I.		5	54	26	II. Tr. E.					
	14	41	48	I.*Sh. E.		9	14	24	II. Oc. R.		7	27	19	I. Sh. E.					
	15	12	2	I.*Tr. E.		11	4	29	I. Sh. E.		7	30	41	I. Tr. E.					
						11	21	37	I.*Tr. E.										
9	9	42	17	I. Ec. D.						27	2	29	12	I. Ec. D.					
	12	23	4	I.*Oc. R.	18	6	5	34	I. Ec. D.		4	42	37	I. Oc. R.					

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

NOVEMBER.			
<i>Phases of the Eclipses of the Satellites for an Inverting Telescope.</i>			
I.		III.	
II.		IV. No Eclipse.	

<i>Configurations at 17<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.</i>			
Day.	West.		East.
1	.4	.3 1.	○
2	.4	.2	○ .1 .3 ●
3		.4 1.	○ .2 .3
4			○ 2. 1. 3.
5		2. .1	○ 3. .4
6		3. 1	○ .4 .2 ●
7		3.	○ 2. .4 .1 ●
8		.3 2. 1.	○ .4
9		.2 .3	○ .1 4.
10		1.	○ .2 .3 4.
11			○ 1. 4. .3
12		2. .1	○ 4. 3.
13		4. 3.	○ 1. .2 ●
14		4. 3.	○ 2. .1 ●
15	4.	.3 2. 1.	○
16	4.	.2 .3	○ .1
17	.4	1.	○ 3.
18	.4		○ 1. .3
19		.4 2. .1	○ 3.
20	○ 3.	.4 .2	○ 1.
21		3. .1	○ .4 .2
22	○ 1.	.3 2.	○ .4
23		.2 .3	○ .1 .4
24		1.	○ 3. .4
25			○ 1. .3 4.
26		2. .1	○ 3. 4.
27		.2 3	○ 1. 4.
28		3. .1	○ 4.
29	○ 2.	.3 1	○ .4
30		4. 3.	○ .1 ●

GREENWICH MEAN TIME.

DECEMBER.

d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s	
1	8	51	10	III. Oc. D.	10	8	32	24	II. Sh. I.	19	5	10	24	III. Tr. I.	28	1	9	59	I. Tr. I.
	11	4	9	III.*Ec. R.		8	48	10	I. Tr. I.		5	29	2	I. Sh. I.		1	39	34	II. Tr. I.
	11	13	14	II.*Oc. D.		9	5	48	I. Sh. I.		7	1	5	III. Tr. E.		1	52	27	I. Sh. I.
	12	38	49	I.*Tr. I.		10	25	9	II.*Tr. E.		7	7	49	I. Tr. E.		3	7	33	II. Sh. I.
	12	42	45	I.*Sh. I.		10	57	32	I.*Tr. E.		7	10	15	III. Sh. I.		3	19	24	I. Tr. E.
	13	50	26	II.*Ec. R.		11	4	6	II.*Sh. E.		7	39	21	I. Sh. E.		4	2	40	I. Sh. E.
	14	48	7	I.*Tr. E.		11	16	10	I.*Sh. E.		8	18	10	II. Ec. R.		4	9	25	II. Tr. E.
	14	53	5	I.*Sh. E.							9	16	32	III. Sh. E.		5	39	10	II. Sh. E.
					11	5	59	55	I. Oc. D.						22	23	1		I. Oc. D.
						8	30	53	I. Ec. R.	20	2	10	44	I. Oc. D.					
2	9	49	55	I. Oc. D.							4	55	1	I. Ec. R.	29	1	19	26	I. Ec. R.
	12	6	50	I.*Ec. R.	12	1	53	35	III. Tr. I.		23	20	50	II. Tr. I.		19	36	31	I.*Tr. I.
3	5	41	13	II. Tr. I.		2	32	35	II. Oc. D.		23	24	35	I. Tr. I.		20	11	1	II.*Oc. D.
	5	54	21	II. Sh. I.		3	10	5	III. Sh. I.		23	57	42	I. Sh. I.		20	21	10	I.*Sh. I.
	7	4	39	I. Tr. I.		3	14	7	I. Tr. I.						21	45	56		I. Tr. E.
	7	11	21	I. Sh. I.		3	34	26	I. Sh. I.	21	0	29	11	II. Sh. I.		22	1	16	III. Oc. D.
	8	9	30	II. Tr. E.		3	41	53	III. Tr. E.		1	34	0	I. Tr. E.		22	31	22	I. Sh. E.
	8	26	0	II. Sh. E.		5	15	14	III. Sh. E.		1	50	15	II. Tr. E.		23	57	41	III. Oc. R.
	9	13	57	I. Tr. E.		5	23	29	I. Tr. E.		2	7	59	I. Sh. E.					
	9	21	42	I. Sh. E.		5	42	57	II. Ec. R.		3	0	52	II. Sh. E.	30	0	11	11	II. Ec. R.
						5	44	47	I. Sh. E.		20	37	8	I.*Oc. D.		1	0	48	III. Ec. D.
4	4	15	56	I. Oc. D.							23	23	57	I. Ec. R.		3	10	21	III. Ec. R.
	6	35	41	I. Ec. R.	13	0	25	58	I. Oc. D.						16	49	35		I.*Oc. D.
	22	38	21	III.*Tr. I.		2	59	40	I. Ec. R.	22	17	50	52	I.*Tr. I.		19	48	16	I.*Ec. R.
	23	9	33	III.*Sh. I.		21	3	53	II.*Tr. I.		17	54	24	II.*Oc. D.					
						21	40	6	I.*Tr. I.		18	26	23	I.*Sh. I.	31	14	3	7	I.*Tr. I.
5	0	19	30	II. Oc. D.		21	50	57	II.*Sh. I.		18	39	15	III.*Oc. D.		14	49	53	I.*Sh. I.
	0	24	36	III. Tr. E.		22	3	4	I.*Sh. I.		20	0	16	I.*Tr. E.		14	50	9	II.*Tr. I.
	1	13	32	III. Sh. E.		23	32	51	II. Tr. E.		20	32	59	III.*Oc. R.		16	12	31	I.*Tr. E.
	1	30	28	I. Tr. I.		23	49	29	I. Tr. E.		20	36	40	I.*Sh. E.		16	27	15	II.*Sh. I.
	1	39	56	I. Sh. I.							21	0	3	III.*Ec. D.		17	0	4	I.*Sh. E.
	3	7	54	II. Ec. R.	14	0	13	24	I. Sh. E.		21	35	48	II.*Ec. R.		17	20	13	II.*Tr. E.
	3	39	48	I. Tr. E.		0	22	41	II. Sh. E.		23	8	18	III. Ec. R.		18	58	46	II.*Sh. E.
	3	50	18	I. Sh. E.		18	52	9	I.*Oc. D.										
	22	41	49	I.*Oc. D.		21	28	33	I.*Ec. R.	23	15	3	26	I.*Oc. D.					
											17	52	44	I.*Ec. R.					
6	1	4	25	I. Ec. R.	15	15	20	51	III.*Oc. D.										
	18	48	14	II.*Tr. I.		15	39	31	II.*Oc. D.	24	12	17	12	I.*Tr. I.					
	19	12	51	II.*Sh. I.		16	6	10	I.*Tr. I.		12	30	26	II.*Tr. I.					
	19	56	19	I.*Tr. I.		16	31	43	I.*Sh. I.		12	55	5	I.*Sh. I.					
	20	8	32	I.*Sh. I.		18	15	33	I.*Tr. E.		13	48	52	II.*Sh. I.					
	21	16	44	II.*Tr. E.		18	42	3	I.*Sh. E.		14	26	36	I.*Tr. E.					
	21	44	33	II.*Sh. E.		19	0	32	II.*Ec. R.		15	0	4	II.*Tr. E.					
	22	5	40	I.*Tr. E.		19	6	35	III.*Ec. R.		15	5	20	I.*Sh. E.					
	22	18	54	I.*Sh. E.							16	20	29	II.*Sh. E.					
					16	13	18	15	I.*Oc. D.										
7	17	7	53	I.*Oc. D.		15	57	19	I.*Ec. R.	25	9	29	55	I. Oc. D.					
	19	33	16	I.*Ec. R.							12	21	40	I.*Ec. R.					
					17	10	12	39	II. Tr. I.										
8	12	5	17	III.*Oc. D.		10	32	17	I.*Tr. I.	26	6	43	34	I. Tr. I.					
	13	25	57	II.*Oc. D.		11	0	23	I.*Sh. I.		7	2	28	II. Oc. D.					
	14	22	14	I.*Tr. I.		11	10	34	II.*Sh. I.		7	23	45	I. Sh. I.					
	14	37	10	I.*Sh. I.		12	41	40	I.*Tr. E.		8	30	37	III. Tr. I.					
	15	5	19	III.*Ec. R.		12	41	51	II.*Tr. E.		8	52	59	I. Tr. E.					
	16	25	25	II.*Ec. R.		13	10	42	I.*Sh. E.		9	34	0	I. Sh. E.					
	16	31	34	I.*Tr. E.		13	42	15	II.*Sh. E.		10	23	52	III.*Tr. E.					
	16	47	32	I.*Sh. E.							10	53	29	II.*Ec. R.					
					18	7	44	31	I. Oc. D.		11	10	49	III.*Sh. I.					
9	11	33	49	I.*Oc. D.		10	26	13	I.*Ec. R.		13	18	14	III.*Sh. E.					
	14	2	1	I.*Ec. R.															
					19	4	46	46	II. Oc. D.	27	3	56	23	I. Oc. D.					
10	7	56	25	II. Tr. I.		4	58	24	I. Tr. I.		6	50	29	I. Ec. R.					

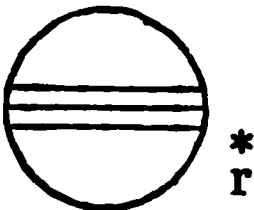
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

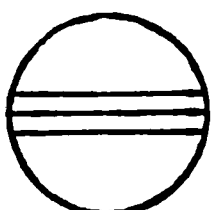
DECEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

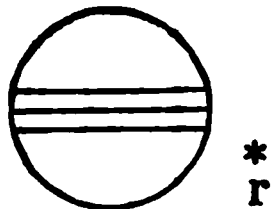
I.



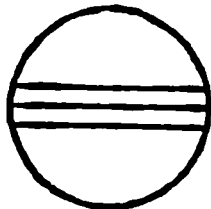
III.



II.



IV. No Eclipse.



Configurations at 16<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.

Day.	West.	East.
1	4.	1. O 2. 3.
2	4.	O .1 2. .3
3	4.	2. 1. O 3.
4	.4	.2 O 3. 1.
5	.4 3. .1	O .2
6	3. .4	O 2. 1.
7	3. 4.	1. O
8	O 1.	O .3 .4 .2
9		O .1 2. .3 .4
10	1. 2.	O 3. .4
11	.2	O 3. 1. .4
12	3. 1.	O .2 4.
13	3.	O 1. 4.
14	.3 2. .1	O 4.
15	O 1.	O 4. .2 .3
16	4.	O .1 2. .3
17	4.	1. 2. O 3.
18	4.	.2 O 1. 3.
19	4.	1. 2. O
20	.4 3.	O 1. 2.
21	.4 .3 2. .1	O
22	.4	2. 3. O 1.
23	.4	O 2. 3. .1
24		1. 2. O 3.
25	.2	O .1 3. .4
26	1. 3.	O .2 .4
27	3.	O 1. 2. .4
28	.3 2. .1	O .4
29	2. 3.	O 1. 4.
30		. O 1. 2. 3. 4.
31	O 2.	O 4. .3

658 MAGNITUDE AND RINGS OF SATURN, 1917.

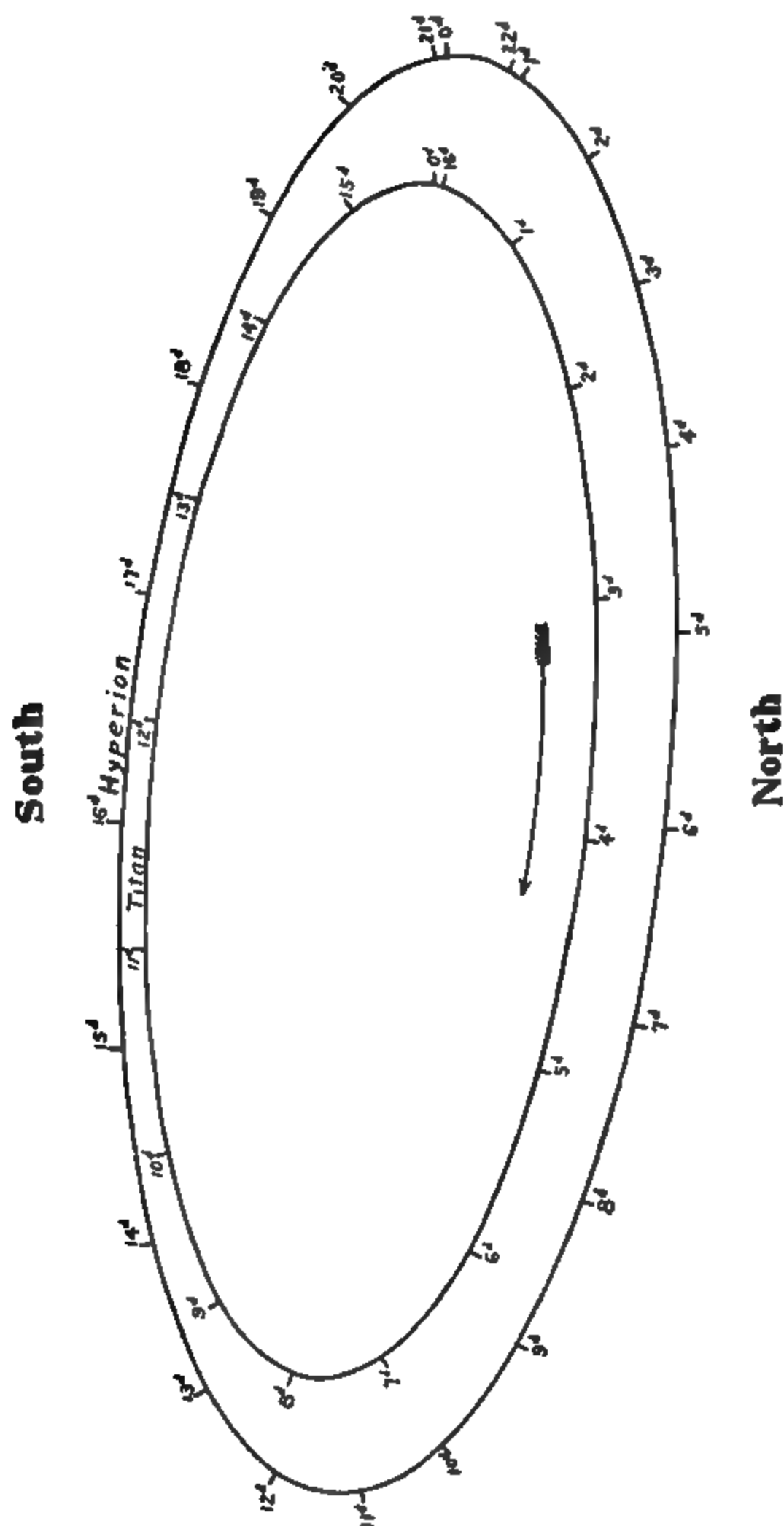
ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, APPEARANCE,  
AND MAGNITUDE OF SATURN'S RINGS.

Greenwich Mean Midnight.		<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	<i>α</i>	<i>B'</i>	<i>U'</i>	Stellar Mag.
		"	"	° '	° '	° '	° '	° '	° '	
Jan.	1	46.23	-16.78	-7 18.6	-21 17.2	356 5.0	42 23.4	-21 51.6	311 47.9	0.0
	9	46.40	17.03	7 18.6	21 30.1	355 26.8	42 23.3	21 46.8	312 6.3	-0.1
	17	46.46	17.23	7 18.7	21 43.6	354 47.0	42 23.3	21 41.9	312 24.7	0.1
	25	46.39	17.35	7 18.5	21 56.8	354 7.0	42 23.2	21 37.0	312 43.1	0.1
Feb.	2	46.22	17.43	7 18.4	22 9.4	353 28.4	42 23.2	21 32.0	313 1.5	-0.1
	10	45.92	-17.46	-7 18.2	-22 20.8	352 52.9	42 23.2	-21 27.0	313 19.9	0.0
	18	45.55	17.44	7 17.9	22 31.0	352 21.2	42 23.1	21 22.0	313 38.2	0.0
	26	45.08	17.36	7 17.7	22 39.4	351 54.8	42 23.1	21 16.9	313 56.5	+0.1
Mar.	6	44.56	17.24	7 17.6	22 45.8	351 34.6	42 23.0	21 11.8	314 14.8	0.1
	14	43.98	17.07	7 17.5	22 50.3	351 21.2	42 23.0	21 6.6	314 33.0	0.2
	22	43.38	-16.86	-7 17.5	-22 52.7	351 14.8	42 23.0	-21 1.4	314 51.2	+0.2
	30	42.74	16.62	7 17.5	22 52.8	351 15.7	42 22.9	20 56.3	315 9.4	0.3
Apr.	7	42.12	16.36	7 17.6	22 51.1	351 24.0	42 22.9	20 51.1	315 27.6	0.3
	15	41.49	16.07	7 17.8	22 47.0	351 39.5	42 22.9	20 45.8	315 45.7	0.3
	23	40.90	15.77	7 18.0	22 41.0	352 1.7	42 22.8	20 40.6	316 3.8	0.4
May	1	40.33	-15.47	-7 18.2	-22 33.4	352 30.4	42 22.8	-20 35.3	316 21.8	+0.4
	9	39.80	15.16	7 18.5	22 23.6	353 4.9	42 22.7	20 30.1	316 39.9	0.4
	17	39.30	14.85	7 18.7	22 12.1	353 44.6	42 22.7	20 24.7	316 57.9	0.5
	25	38.85	14.54	7 19.0	21 58.9	354 29.1	42 22.7	20 19.3	317 15.8	0.5
June	2	38.45	14.24	7 19.1	21 44.4	355 18.0	42 22.6	20 13.9	317 33.8	0.5
	10	38.10	-13.94	-7 19.1	-21 28.3	356 10.3	42 22.6	-20 8.5	317 51.8	+0.5
	18	37.80	13.66	7 19.0	21 10.9	357 5.5	42 22.6	20 2.9	318 9.7	0.5
	26	37.56	13.38	7 18.7	20 52.3	358 3.2	42 22.5	19 57.4	318 27.6	0.5
July	4	37.37	13.11	7 18.3	20 32.8	359 2.6	42 22.5	19 51.8	318 45.5	0.5
	12	37.24	12.86	7 17.7	20 12.6	0 3.3	42 22.5	19 46.3	319 3.4	0.4
	20	37.16	-12.62	-7 17.0	-19 51.5	1 4.8	42 22.4	-19 40.7	319 21.2	+0.4
	28	37.14	12.40	7 16.1	19 29.9	2 6.5	42 22.4	19 35.0	319 38.9	0.4
Aug.	5	37.17	12.19	7 15.2	19 8.3	3 7.9	42 22.3	19 29.4	319 56.7	0.5
	13	37.26	12.00	7 14.1	18 46.6	4 8.3	42 22.3	19 23.7	320 14.5	0.5
	21	37.41	11.82	7 12.8	18 25.0	5 7.4	42 22.3	19 18.0	320 32.2	0.5
	29	37.61	-11.66	-7 11.5	-18 3.6	6 4.7	42 22.2	-19 12.2	320 49.9	+0.6
Sept.	6	37.87	11.52	7 10.1	17 43.0	6 59.4	42 22.2	19 6.5	321 7.6	0.6
	14	38.19	11.41	7 8.6	17 23.4	7 51.2	42 22.2	19 0.7	321 25.2	0.6
	22	38.56	11.32	7 7.3	17 4.7	8 39.8	42 22.1	18 54.8	321 42.8	0.6
	30	38.97	11.26	7 5.9	16 47.9	9 24.2	42 22.1	18 49.0	322 0.5	0.6
Oct.	8	39.44	-11.22	-7 4.7	-16 32.5	10 4.3	42 22.0	-18 43.1	322 18.1	+0.6
	16	39.94	11.22	7 3.5	16 19.1	10 39.2	42 22.0	18 37.3	322 35.6	0.6
	24	40.49	11.25	7 2.5	16 7.9	11 8.8	42 22.0	18 31.3	322 53.2	0.6
	1	41.06	11.31	7 1.7	15 59.3	11 32.5	42 21.9	18 25.4	323 10.7	0.6
Nov.	9	41.67	11.41	7 1.1	15 53.3	11 49.9	42 21.9	18 19.5	323 28.1	0.5
	17	42.28	-11.54	-7 0.7	-15 50.0	12 0.8	42 21.9	-18 13.6	323 45.6	+0.5
	25	42.91	11.70	7 0.6	15 49.9	12 4.9	42 21.8	18 7.6	324 3.0	0.5
	3	43.51	11.90	7 0.7	15 52.4	12 2.0	42 21.8	18 1.6	324 20.4	0.4
Dec.	11	44.09	12.13	7 1.1	15 58.0	11 52.5	42 21.7	17 55.5	324 37.7	0.4
	19	44.62	12.38	7 1.9	16 6.2	11 36.6	42 21.7	17 49.4	324 55.1	0.3
	27	45.10	-12.64	-7 2.8	-16 17.0	11 14.6	42 21.7	-17 43.4	325 12.4	+0.3

The factor to be multiplied by *a* and *b* to obtain the axes of—

The inner ellipse of the outer ring=0.8801,	log factor=9.9445
The outer ellipse of the inner ring=0.8599,	log factor=9.9344
The inner ellipse of the inner ring=0.6650,	log factor=9.8228
The inner ellipse of the dusky ring=0.5486,	log factor=9.7392

*NOTE.*—The negative sign of *B* indicates that the visible surface of the rings is the southern one.



Names of the Satellites.

- I. Mimas.
- II. Enceladus.
- III. Tethys.
- IV. Dione.
- V. Rhea.
- VI. Titan.
- VII. Hyperion.
- VIII. Lapetus.
- IX. Phoebe.

Mean Synodic Periods.			
	d	h	
I.	0	22.6	
II.	1	8.9	
III.	1	21.3	
IV.	2	17.7	
V.	4	12.5	
VI.	15	23.3	
VII.	21	7.6	
VIII.	79	22.1	
IX.	823	15.6	

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN,

AT DATE OF OPPOSITION, JANUARY 17, 1917,

AS SEEN IN AN INVERTING TELESCOPE.



GREENWICH MEAN TIME.

In the diagram on the preceding page, the points of the orbits marked "0" are those of the eastern elongation, as seen in an inverting telescope. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular, and the time of any greatest elongation not given in the tables may be readily found from those given by adding or subtracting the proper multiple of the mean synodic period. For Titan, Hyperion, and Iapetus the eccentricity is taken into account, and for Iapetus the times both of the greatest elongations and of the conjunctions are given. The following abbreviations are used in the tables:

- E., Eastern Elongation.  
W., Western Elongation.
- I., Inferior Conjunction (north of planet).  
S., Superior Conjunction (south of planet).

MIMAS.

Greatest Elongations Visible in the United States.

Jan.	d h	Jan.	d h	Feb.	d h	Apr.	d h	Oct.	d h	Nov.	d h
	1 19.0 E.		29 14.0 W.		25 21.9 W.		3 16.0 W.		12 23.4 W.		27 16.4 E.
	2 17.6 E.		30 1.4 E.		26 20.5 W.		4 14.6 W.		13 22.0 W.		30 0.9 W.
	3 16.2 E.		30 12.7 W.		27 19.1 W.		5 13.3 W.		14 20.6 W.		30 23.5 W.
	4 14.8 E.		31 0.0 E.		28 17.7 W.		8 20.4 E.		15 19.3 W.		Dec. 1 22.2 W.
	5 2.1 W.		31 11.3 W.		Mar. 1 16.4 W.		9 19.0 E.		20 1.1 E.		2 20.8 W.
	5 13.4 E.		31 22.6 E.		2 15.0 W.		10 17.7 E.		20 23.7 E.		3 19.4 W.
	6 0.8 W.		Feb. 1 21.2 E.		3 13.6 W.		11 16.3 E.		21 22.3 E.		4 18.0 W.
	6 12.1 E.		2 19.8 E.		4 12.2 W.		12 14.9 E.		22 20.9 E.		5 16.6 W.
	6 23.4 W.		3 18.4 E.		5 22.2 E.		13 13.5 E.		23 19.5 E.		6 15.2 W.
7 22.0 W.	4 17.0 E.	6 20.8 E.	17 19.3 W.	24 18.1 E.	8 1.2 E.						
8 20.6 W.	5 15.6 E.	7 19.4 E.	18 18.0 W.	28 1.3 W.	8 23.8 E.						
9 19.2 W.	6 14.2 E.	8 18.0 E.	19 16.6 W.	28 23.9 W.	9 22.4 E.						
10 17.8 W.	7 12.9 E.	9 16.7 E.	20 15.2 W.	29 22.5 W.	10 21.0 E.						
11 16.4 W.	8 0.2 W.	10 15.3 E.	21 13.8 W.	30 21.2 W.	11 19.6 E.						
12 15.0 W.	8 11.5 E.	11 13.9 E.	25 19.6 E.	31 19.8 W.	12 18.3 E.						
13 13.6 W.	8 22.8 W.	12 12.5 E.	26 18.3 E.	Nov. 1 18.4 W.	13 16.9 E.						
14 1.0 E.	9 21.4 W.	13 22.4 W.	27 16.9 E.	6 0.2 E.	14 15.5 E.						
14 12.3 W.	10 20.0 W.	14 21.0 W.	28 15.5 E.	6 22.8 E.	16 1.4 W.						
14 23.6 E.	11 18.6 W.	15 19.7 W.	29 14.1 E.	7 21.4 E.	17 0.0 W.						
15 22.2 E.	12 17.2 W.	16 18.3 W.	May 4 18.6 W.	8 20.0 E.	17 22.7 W.						
16 20.8 E.	13 15.8 W.	17 16.9 W.	5 17.2 W.	9 18.6 E.	18 21.3 W.						
17 19.4 E.	14 14.4 W.	18 15.5 W.	6 15.8 W.	10 17.3 E.	19 19.9 W.						
18 18.0 E.	15 13.1 W.	19 14.1 W.	7 14.4 W.	13 1.8 W.	20 18.5 W.						
19 16.6 E.	16 0.4 E.	20 12.8 W.	8 13.1 W.	14 0.4 W.	21 17.1 W.						
20 15.2 E.	16 11.7 W.	22 21.3 E.	13 17.5 E.	14 23.0 W.	22 15.7 W.						
21 13.8 E.	16 23.0 E.	23 19.9 E.	14 16.1 E.	15 21.7 W.	23 14.3 W.						
22 1.2 W.	17 21.6 E.	24 18.5 E.	15 14.7 E.	16 20.3 W.	24 1.6 E.						
22 12.5 E.	18 20.2 E.	25 17.2 E.	16 13.4 E.	17 18.9 W.	25 0.2 E.						
22 23.8 W.	19 18.8 E.	26 15.8 E.	. . . .	18 17.5 W.	25 22.8 E.						
23 22.4 W.	20 17.4 E.	27 14.4 E.	. . . .	22 0.7 E.	26 21.4 E.						
24 21.0 W.	21 16.1 E.	28 13.0 E.	Oct. 4 0.5 E.	22 23.3 E.	27 20.0 E.						
25 19.6 W.	22 14.7 E.	30 21.5 W.	4 23.1 E.	23 21.9 E.	28 18.6 E.						
26 18.2 W.	23 13.3 E.	31 20.2 W.	5 21.7 E.	24 20.5 E.	29 17.3 E.						
27 16.8 W.	24 11.9 E.	Apr. 1 18.8 W.	6 20.3 E.	25 19.1 E.	30 15.9 E.						
28 15.4 W.	24 23.3 W.	2 17.4 W.	12 0.8 W.	26 17.8 E.	31 14.5 E.						

## SATELLITES OF SATURN, 1917.

661:

## GREENWICH MEAN TIME.

## ENCELADUS.

[illegible]

## TETHYS.

	d	h		d	h		d	h		d	h		d	h		d	h
<b>Jan.</b>	1	4.2 E.		<b>Feb.</b>	9 19.3 E.		<b>Mar.</b>	21 10.6 E.		<b>Apr.</b>	30 2.3 E.		<b>Oct.</b>	15 4.9 E.		<b>Nov.</b>	23 20.4 E.
	3	1.5 E.			11 16.6 E.			23 7.9 E.		<b>May</b>	1 23.6 E.			17 2.2 E.			25 17.7 E.
	4	22.8 E.			13 13.8 E.			25 5.2 E.			3 20.9 E.			18 23.5 E.			27 15.1 E.
	6	20.1 E.			15 11.1 E.			27 2.5 E.			5 18.2 E.			20 20.8 E.			29 12.4 E.
	8	17.4 E.			17 8.4 E.			28 23.8 E.			7 16.6 E.			22 18.2 E.		<b>Dec.</b>	1 9.7 E.
	10	14.7 E.			19 5.7 E.			30 21.1 E.			9 12.9 E.			24 15.5 E.			3 7.0 E.
	12	11.9 E.			21 3.0 E.		<b>Apr.</b>	1 18.4 E.			11 10.2 E.			26 12.8 E.			5 4.3 E.
	14	9.2 E.			23 0.3 E.			3 15.7 E.			13 7.5 E.			28 10.1 E.			7 1.6 E.
	16	6.5 E.			24 21.6 E.			5 13.0 E.			15 4.9 E.			30 7.5 E.			8 22.9 E.
	18	3.8 E.			26 18.9 E.			7 10.3 E.			17 2.2 E.		<b>Nov.</b>	1 4.8 E.			10 20.2 E.
	20	1.1 E.			28 16.2 E.			9 7.6 E.			18 23.5 E.			3 2.1 E.			12 17.5 E.
	21	22.4 E.		<b>Mar.</b>	2 13.5 E.			11 4.9 E.			. . . .			4 23.4 E.			14 14.8 E.
	23	19.7 E.			4 10.8 E.			13 2.3 E.			. . . .			6 20.7 E.			16 12.1 E.
	25	17.0 E.			6 8.1 E.			14 23.6 E.		<b>Sept.</b>	30 2.3 E.			8 18.0 E.			18 9.4 E.
	27	14.2 E.			8 5.4 E.			16 21.0 E.		<b>Oct.</b>	1 23.6 E.			10 15.3 E.			20 6.7 E.
	29	11.5 E.			10 2.7 E.			18 18.3 E.			3 20.9 E.			12 12.6 E.			22 4.0 E.
	31	8.8 E.			12 0.0 E.			20 15.6 E.			5 18.3 E.			14 9.9 E.			24 1.3 E.
<b>Feb.</b>	2	6.1 E.			13 21.3 E.			22 13.0 E.			7 15.6 E.			16 7.2 E.			25 22.6 E.
	4	3.4 E.			15 18.7 E.			24 10.3 E.			9 12.9 E.			18 4.5 E.			27 19.9 E.
	6	0.7 E.			17 16.0 E.			26 7.6 E.			11 10.2 E.			20 1.8 E.			29 17.1 E.
	7	22.0 E.			19 13.3 E.			28 4.9 E.			13 7.6 E.			21 23.1 E.			31 14.4 E.

GREENWICH MEAN TIME.

DIONE.

	d	h		d	h		d	h		d	h		d	h		d	h
Jan.	1	6.4 E.	Feb.	11	7.0 E.	Mar.	24	8.1 E.	May	4	9.6 E.	Oct.	21	5.5 E.	Dec.	1	6.9 E.
	4	0.0 E.		14	0.6 E.		27	1.8 E.		7	3.4 E.		23	23.2 E.		4	0.6 E.
	6	17.6 E.		16	18.3 E.		29	19.5 E.		9	21.1 E.		26	16.9 E.		6	18.3 E.
	9	11.3 E.		19	11.9 E.		1	13.1 E.		12	14.8 E.		29	10.7 E.		9	12.0 E.
	12	4.9 E.		22	5.6 E.		4	6.8 E.		15	8.5 E.		1	4.4 E.		12	5.7 E.
	14	22.5 E.	Mar.	24	23.3 E.		7	0.5 E.	Oct.	18	2.3 E.		3	22.1 E.		14	23.3 E.
	17	16.2 E.		27	16.9 E.		9	18.2 E.		. . . .	6		15.8 E.	17		17.0 E.	
	20	9.8 E.		2	10.6 E.		12	11.9 E.		. . . .	9		9.5 E.	20		10.7 E.	
	23	3.4 E.		5	4.3 E.		15	5.6 E.		2	1.5 E.		12	3.1 E.		23	4.3 E.
	25	21.1 E.		7	22.0 E.		17	23.3 E.		4	19.2 E.		14	20.8 E.		25	22.0 E.
Feb.	28	14.7 E.		10	15.7 E.		20	17.1 E.		7	12.9 E.		17	14.5 E.		28	15.6 E.
	31	8.4 E.		13	9.4 E.		23	10.8 E.		10	6.6 E.		20	8.2 E.		31	9.3 E.
	3	2.0 E.		16	3.0 E.		26	4.5 E.		13	0.4 E.		23	1.9 E.			
	5	19.7 E.		18	20.7 E.		28	22.2 E.		15	18.1 E.		25	19.6 E.			
	8	13.3 E.		21	14.4 E.		1	15.9 E.		18	11.8 E.		28	13.2 E.			

RHEA.

	d h		d h		d h		d h		d h		d h
Jan.	3 23.9 E.	Feb.	13 14.7 E.	Mar.	26 6.1 E.	May	5 22.5 E.	Oct.	15 19.0 E.	Nov.	25 11.1 E.
	8 12.2 E.		18 3.1 E.		30 18.6 E.		10 11.0 E.		20 7.5 E.		29 23.5 E.
	13 0.5 E.		22 15.4 E.	Apr.	4 7.0 E.		14 23.6 E.		24 20.0 E.	Dec.	4 11.9 E.
	17 12.8 E.		27 3.8 E.		8 19.5 E.		19 12.1 E.		29 8.4 E.		9 0.3 E.
	22 1.1 E.	Mar.	3 16.1 E.		13 8.0 E.		. . . .	Nov.	2 20.9 E.		13 12.7 E.
	26 13.4 E.		8 4.5 E.		17 20.5 E.		. . . .		7 9.4 E.		18 1.1 E.
	31 1.7 E.		12 16.9 E.		22 9.0 E.	Oct.	2 5.4 E.		11 21.8 E.		22 13.4 E.
Feb.	4 14.1 E.		17 5.3 E.		26 21.5 E.		6 18.0 E.		16 10.3 E.		27 1.8 E.
	9 2.4 E.		21 17.7 E.	May	1 10.0 E.		11 6.5 E.		20 22.7 E.		31 14.1 E.

TITAN.

	d	h		d	h		d	h		d	h		d	h				
Jan.	7	5.7 E.	Feb.	15	16.3 W.	Mar.	27	18.6 E.	May	6	10.2 W.	Oct.	13	16.2 W.	Nov.	22	20.8 E.	
	14	21.6 W.		23	22.0 E.	Apr.	4	11.2 W.		14	17.2 E.		21	22.4 E.		30	13.9 W.	
	23	3.0 E.	Mar.	3	14.1 W.		12	17.7 E.		.	.	.		29	15.9 W.	Dec.	8	19.4 E.
	30	18.9 W.		11	20.1 E.		20	10.5 W.		.	.	.	Nov.	6	21.8 E.		16	12.2 W.
Feb.	8	0.4 E.		19	12.4 W.		28	17.2 E.	Oct.	5	22.5 E.		14	15.2 W.		24	17.4 E.	

HYPERION.

	d	h		d	h		d	h		d	h		d	h				
Jan.	5	12.4 E.	Feb.	16	15.7 E.	Mar.	30	22.3 E.	May	12	10.8 E.	Oct.	21	3.9 W.	Dec.	2	23.1 W.	
	17	1.5 W.		28	5.3 W.	Apr.	11	13.6 W.		.	.	.		31	1.4 E.		12	20.8 E.
	26	13.9 E.	Mar.	9	18.4 E.		21	3.9 E.		.	.	.	Nov.	11	14.0 W.		24	7.4 W.
Feb.	7	3.0 W.		21	8.7 W.	May	2	19.7 W.	Oct.	9	14.2 E.		21	11.6 E.				

IAPETUS.

Jan.	d h 10 8.5 E. 30 2.6 I.	Feb.	d h 17 16.8 W. Mar. 9 0.5 S.	Mar.	d h 29 18.9 E. Apr. 19 1.3 I.	May	d h 8 3.7 W. . . . .	Oct.	d h 17 10.2 W. Nov. 6 11.4 S.	Nov.	d h 27 10.3 E.	Dec.	d h 17 3.2 I.
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DIFFERENTIAL COORDINATES OF PHOEBE.

FOR GREENWICH MEAN NOON.

Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$
	m s	' "		m s	' "		m s	' "
Jan. 0	+2 9.7	-6 15	Apr. 14	+1 47.5	-1 30	Sept. 20	-1 48.4	+ 8 34
2	2 11.6	6 14	16	1 45.2	1 24	22	1 50.3	8 41
4	2 13.3	6 12	18	1 42.8	1 18	24	1 52.2	8 48
6	2 15.0	6 10	20	1 40.4	1 12	26	1 54.1	8 54
8	2 16.6	6 7	22	1 37.9	1 6	28	1 55.9	9 0
10	+2 18.1	-6 4	24	+1 35.4	-1 0	30	-1 57.6	+ 9 6
12	2 19.5	6 1	26	1 32.8	0 54	Oct. 2	1 59.3	9 12
14	2 20.8	5 58	28	1 30.2	0 48	4	2 1.0	9 18
16	2 22.0	5 54	30	1 27.6	0 42	6	2 2.6	9 23
18	2 23.0	5 50	May 2	1 25.0	0 36	8	2 4.2	9 28
20	+2 24.0	-5 46	4	+1 22.3	-0 29	10	-2 5.7	+ 9 33
22	2 24.9	5 41	6	1 19.6	0 23	12	2 7.2	9 38
24	2 25.7	5 36	8	1 16.8	0 17	14	2 8.6	9 42
26	2 26.4	5 31	10	1 14.0	0 11	16	2 9.9	9 46
28	2 27.0	5 26	12	1 11.2	-0 5	18	2 11.2	9 50
30	+2 27.6	-5 21	14	+1 8.4	+0 2	20	-2 12.5	+ 9 54
Feb. 1	2 28.0	5 16	16	1 5.5	0 8	22	2 13.7	9 57
3	2 28.3	5 10	18	1 2.7	0 15	24	2 14.9	10 0
5	2 28.5	5 4	20	0 59.8	0 21	26	2 16.0	10 2
7	2 28.7	4 58	22	0 56.9	0 28	28	2 17.0	10 4
9	+2 28.7	-4 52	24	+0 53.9	+0 34	30	-2 18.0	+10 6
11	2 28.6	4 46	26	0 51.0	0 41	Nov. 1	2 19.0	10 8
13	2 28.5	4 40	28	0 48.0	0 48	3	2 19.8	10 9
15	2 28.2	4 33	30	0 45.1	0 54	5	2 20.6	10 10
17	2 27.9	4 27	June 1	0 42.1	1 1	7	2 21.4	10 11
19	+2 27.5	-4 21	3	+0 39.1	+1 8	9	-2 22.1	+10 11
21	2 27.0	4 14	5	0 36.1	1 15	11	2 22.8	10 11
23	2 26.4	4 8	7	0 33.0	1 23	13	2 23.4	10 11
25	2 25.7	4 1	9	0 30.0	1 30	15	2 23.9	10 10
27	2 25.0	3 55	11	0 27.0	1 37	17	2 24.4	10 9
Mar. 1	+2 24.1	-3 48	13	+0 24.0	+1 44	19	-2 24.8	+10 8
3	2 23.2	3 42	15	0 20.9	1 52	21	2 25.1	10 6
5	2 22.2	3 35	17	0 17.9	2 0	23	2 25.4	10 4
7	2 21.1	3 28	19	0 14.9	2 7	25	2 25.6	10 1
9	2 20.0	3 22	21	0 11.8	2 15	27	2 25.8	9 58
11	+2 18.7	-3 16	23	+0 8.8	+2 23	29	-2 25.9	+ 9 55
13	2 17.4	3 9	25	0 5.8	2 31	Dec. 1	2 25.9	9 51
15	2 16.0	3 3	27	+0 2.8	+2 39	3	2 25.9	9 47
17	2 14.6	2 56		. . . .	. . .	5	2 25.8	9 43
19	2 13.0	2 50		. . . .	. . .	7	2 25.6	9 38
21	+2 11.4	-2 44	Aug. 27	-1 22.3	+7 2	9	-2 25.3	+ 9 33
23	2 9.8	2 37	29	1 24.7	7 10	11	2 25.0	9 27
25	2 8.0	2 31	31	1 27.0	7 18	13	2 24.6	9 21
27	2 6.2	2 25	Sept. 2	1 29.3	7 26	15	2 24.2	9 15
29	2 4.4	2 19	4	1 31.6	7 34	17	2 23.6	9 8
31	+2 2.5	-2 12	6	-1 33.8	+7 42	19	-2 23.0	+ 9 1
Apr. 2	2 0.5	2 6	8	1 36.0	7 50	21	2 22.4	8 53
4	1 58.5	2 0	10	1 38.2	7 58	23	2 21.6	8 46
6	1 56.4	1 54	12	1 40.3	8 5	25	2 20.8	8 38
8	1 54.3	1 48	14	1 42.4	8 13	27	2 19.9	8 29
10	+1 52.1	-1 42	16	-1 44.4	+8 20	29	-2 18.9	+ 8 20
12	+1 49.8	-1 36	18	-1 46.5	+8 27	31	-2 17.8	+ 8 11

Time from Eastern Elongation.	Mimas.		Time from Eastern Elongation.	Enceladus.		Tethys.		Time from Eastern Elongation.	Dione.	
	<i>p</i> <sup>1</sup>	<i>F</i>		<i>p</i> <sup>1</sup>	<i>F</i>	<i>p</i> <sup>1</sup>	<i>F</i>		<i>p</i> <sup>1</sup>	<i>F</i>
h	°		d h	°		°		d h	°	
0.0	83.2	1.000	0 0	83.2	1.000	83.2	1.000	0 0	83.2	1.000
0.5	80.4	0.992	0 1	79.1	0.984	80.1	0.992	0 2	79.1	0.984
1.0	77.4	0.967	0 2	74.7	0.938	77.0	0.967	0 4	74.7	0.938
1.5	74.3	0.926	0 3	69.8	0.864	73.6	0.928	0 6	69.7	0.864
2.0	70.8	0.870	0 4	63.6	0.766	69.8	0.874	0 8	63.6	0.765
2.5	66.8	0.801	0 5	55.6	0.652	65.6	0.807	0 10	55.5	0.651
3.0	62.0	0.721	0 6	43.9	0.532	60.4	0.730	0 12	43.7	0.532
3.5	55.8	0.634	0 7	25.9	0.428	54.0	0.647	0 14	25.7	0.427
4.0	47.7	0.544	0 8	359.7	0.372	45.6	0.562	0 16	359.4	0.372
4.5	36.5	0.460	0 9	331.1	0.395	34.4	0.482	0 18	330.8	0.396
5.0	20.7	0.391	0 10	309.4	0.482	19.1	0.418	0 20	309.3	0.484
5.5	0.1	0.355	0 11	295.4	0.598	359.9	0.384	0 22	295.3	0.600
6.0	337.9	0.363	0 12	286.0	0.717	339.4	0.392	1 0	285.9	0.719
6.5	319.0	0.414	0 13	279.1	0.823	321.4	0.437	1 2	279.0	0.825
7.0	305.1	0.491	0 14	273.7	0.908	307.7	0.508	1 4	273.6	0.910
7.5	295.2	0.579	0 15	269.1	0.968	297.5	0.591	1 6	269.1	0.968
8.0	288.0	0.668	0 16	265.0	0.997	289.9	0.676	1 8	264.9	0.997
8.5	282.4	0.753	0 17	260.9	0.995	284.0	0.758	1 10	260.8	0.994
9.0	277.9	0.829	0 18	256.7	0.962	279.2	0.831	1 12	256.6	0.961
9.5	274.1	0.893	0 19	252.0	0.900	275.1	0.834	1 14	251.9	0.898
10.0	270.8	0.943	0 20	246.5	0.812	271.6	0.943	1 16	246.3	0.809
10.5	267.8	0.978	0 21	239.5	0.704	268.3	0.978	1 18	239.2	0.701
11.0	264.9	0.997	0 22	229.6	0.585	265.2	0.995	1 20	229.3	0.582
11.5	262.1	0.999	0 23	214.8	0.470	262.1	0.999	1 22	214.2	0.468
12.0	259.2	0.984	1 0	192.2	0.388	259.0	0.985	2 0	191.3	0.387
12.5	256.3	0.953	1 1	163.3	0.374	255.8	0.955	2 2	162.4	0.376
13.0	253.0	0.906	1 2	138.0	0.438	252.3	0.910	2 4	137.3	0.442
13.5	249.4	0.845	1 3	120.9	0.546	248.4	0.852	2 6	120.4	0.550
14.0	245.1	0.772	1 4	109.7	0.665	243.9	0.781	2 8	109.4	0.670
14.5	239.8	0.689	1 5	101.9	0.778	238.4	0.702	2 10	101.7	0.782
15.0	233.0	0.600	1 6	96.0	0.874	231.4	0.617	2 12	95.8	0.877
15.5	223.9	0.511	1 7	91.1	0.945	222.1	0.533	2 14	90.9	0.947
16.0	211.1	0.431	1 8	86.8	0.988	209.6	0.457	2 16	86.6	0.989
16.5	193.3	0.372	1 9	82.7	1.000	192.9	0.402	2 18	82.5	1.000
17.0	171.5	0.352	1 10			172.8	0.382			
17.5	150.1	0.379	1 11			152.7	0.404			
18.0	133.1	0.441	1 12			136.2	0.460			
18.5	121.0	0.524	1 13			123.8	0.536			
19.0	112.2	0.613	1 14			114.7	0.620			
19.5	105.7	0.701	1 15			107.8	0.705			
20.0	100.6	0.783	1 16			102.3	0.784			
20.5	96.4	0.854	1 17			97.7	0.854			
21.0	92.8	0.914	1 18			93.8	0.912			
21.5	89.6	0.958	1 19			90.4	0.957			
22.0	86.7	0.987	1 20			87.2	0.986			
22.5	83.8	1.000	1 21			84.1	0.999			
23.0	81.0	0.995	1 22			81.1	0.996			

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = F \frac{a(\rho)}{\rho}$ .

Time from Eastern Elongation.	Rhea.		Time from Eastern Elongation.	Titan.		Hyperion.		Time from Eastern Elongation.	Iapetus.	
	<i>p</i> <sup>1</sup>	<i>F</i>		<i>p</i> <sup>1</sup>	<i>F</i>	<i>p</i> <sup>1</sup>	<i>F</i>		<i>p</i> <sup>1</sup>	<i>F</i>
d h	°		d h	°		°		d	°	
0 0	83.2	1.000	0 0	83.2	0.994	83.2	1.007	0	84.5	1.025
0 3	79.4	0.987	0 10	79.6	0.978	80.6	1.010	2	83.4	1.011
0 6	75.4	0.949	0 20	75.9	0.938	78.0	1.000	4	82.2	0.974
0 9	71.0	0.887	1 6	71.7	0.876	75.3	0.978	6	80.8	0.913
0 12	65.8	0.804	1 16	66.8	0.795	72.4	0.945	8	79.2	0.832
0 15	59.3	0.706	2 2	60.6	0.698	69.3	0.901	10	77.3	0.732
0 18	50.4	0.599	2 12	52.3	0.592	65.9	0.849	12	74.6	0.614
0 21	37.8	0.494	2 22	40.3	0.487	61.9	0.789	14	70.6	0.484
1 0	19.1	0.410	3 8	22.4	0.399	57.3	0.723	16	63.5	0.345
1 3	354.1	0.375	3 18	357.8	0.357	51.7	0.654	18	46.8	0.210
1 6	328.8	0.405	4 4	331.4	0.379	44.8	0.584	20	357.2	0.130
1 9	309.7	0.487	4 14	311.2	0.456	36.0	0.518	22	304.1	0.200
1 12	296.6	0.591	5 0	297.6	0.559	24.9	0.461	24	286.0	0.333
1 15	287.6	0.699	5 10	288.3	0.666	11.1	0.419	26	278.4	0.471
1 18	280.9	0.798	5 20	281.6	0.767	355.3	0.402	28	274.2	0.601
1 21	275.7	0.882	6 6	276.4	0.855	339.2	0.412	30	271.4	0.717
2 0	271.2	0.945	6 16	272.0	0.925	324.6	0.447	32	269.4	0.812
2 3	267.2	0.985	7 2	268.2	0.974	312.7	0.499	34	267.8	0.891
2 6	263.4	1.000	7 12	264.7	1.001	303.3	0.563	36	266.4	0.944
2 9	259.7	0.989	7 22	261.3	1.003	295.9	0.632	38	265.1	0.971
2 12	255.7	0.952	8 8	257.8	0.984	289.9	0.701	40	263.8	0.972
2 15	251.4	0.892	8 18	254.1	0.943	285.0	0.767	42	262.5	0.948
2 18	246.2	0.811	9 4	250.0	0.881	280.8	0.827	44	261.2	0.899
2 21	239.8	0.713	9 14	245.1	0.803	277.2	0.880	46	259.6	0.827
3 0	231.2	0.606	10 0	239.1	0.712	273.9	0.923	48	257.6	0.734
3 3	218.8	0.500	10 10	231.2	0.613	271.0	0.956	50	255.0	0.623
3 6	200.6	0.414	10 20	220.2	0.515	268.1	0.977	52	251.2	0.499
3 9	176.0	0.375	11 6	204.6	0.431	265.4	0.985	54	244.7	0.365
3 12	150.4	0.401	11 16	183.3	0.382	262.6	0.980	56	230.6	0.233
3 15	130.8	0.480	12 2	159.4	0.387	259.8	0.962	58	190.6	0.138
3 18	117.4	0.583	12 12	138.8	0.442	256.9	0.929	60	133.0	0.178
3 21	108.2	0.691	12 22	124.0	0.529	253.7	0.884	62	110.0	0.300
4 0	101.4	0.791	13 8	113.5	0.628	250.1	0.826	64	100.9	0.435
4 3	96.0	0.876	13 18	106.0	0.725	245.8	0.757	66	96.1	0.566
4 6	91.5	0.942	14 4	100.2	0.814	240.7	0.679	68	93.0	0.686
4 9	87.5	0.983	14 14	95.4	0.889	234.2	0.595	70	90.8	0.792
4 12	83.7	1.000	15 0	91.3	0.945	225.4	0.510	72	89.1	0.880
4 15	79.9	0.990	15 10	87.6	0.981	213.2	0.431	74	87.7	0.949
			15 20	84.1	0.995	196.8	0.373	76	86.4	0.996
			16 6	80.6	0.984	176.0	0.355	78	85.3	1.021
			16 16			154.5	0.363	80	84.1	1.023
			17 2			136.8	0.417			
			17 12			123.9	0.492			
			17 22			114.5	0.576			
			18 8			107.6	0.662			
			18 18			102.2	0.742			
			19 4			97.8	0.816			
			19 14			94.2	0.879			
			20 0			90.9	0.930			
			20 10			88.0	0.969			
			20 20			85.3	0.995			
			21 6			82.6	1.008			

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = F \frac{a(p)}{p}$ .



**FOR**

**MEAN MIDNIGHT.**



APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF OPPOSITION,  
AUGUST 14, 1917, AS SEEN IN AN INVERTING TELESCOPE.

## South

*Apparent Apocides.*

Date.	Position Angle.	App. Distances.	
		Ariel.	Umbriel.
May 7	349.6	13.2	18.4
Aug. 15	350.2	13.9	19.4
Nov. 23	350.0	13.1	18.3

*Apparent Apocides.*

Date.	Position Angle.	App. Distances.	
		Titania.	Oberon.
May 7	349.6	30.1	40.3
Aug. 15	350.2	31.9	42.6
Nov. 23	350.8	30.0	40.1

## North

## GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.		UMBRIEL.		TITANIA.		OBERON.
North.	South.	North.	South.	North.	South.	North and South.
d h	d h	d h	d h	d h	d h	d h
May 16 9.4	May 20 4.1	May 8 4.7	May 10 6.4	May 8 10.9	May 12 19.3	May 23 23.5 N.
23 22.8	27 17.5	16 11.6	18 13.3	17 3.8	21 12.2	June 4 17.13.
31 12.3	June 4 7.0	24 18.5	26 20.2	25 20.7	30 5.1	11 10.6 N.
June 8 1.7	11 20.4	June 2 1.4	June 4 3.1	June 3 13.6	June 7 22.1	18 4.28.
15 15.2	19 9.9	10 8.3	12 10.0	12 6.5	16 15.0	24 21.8 N.
23 4.6	27 23.4	18 15.2	20 17.0	20 23.5	25 8.0	July 1 15.38.
30 18.1	July 4 12.8	26 22.1	28 23.9	29 16.4	July 4 0.9	8 8.9 N.
July 8 7.6	12 2.3	July 5 5.1	July 7 6.8	July 8 9.4	12 17.9	15 2.58.
15 21.0	19 15.8	13 12.0	15 13.7	17 2.4	21 10.8	21 20.1 N.
23 10.5	27 5.2	21 18.9	23 20.6	25 19.3	30 3.8	28 13.78.
31 0.0	Aug. 3 18.7	30 1.8	Aug. 1 3.6	Aug. 3 12.3	Aug. 7 20.8	Aug. 4 7.3 N.
Aug. 7 18.4	11 8.2	Aug. 7 8.8	9 10.5	12 5.2	16 13.7	11 0.98.
15 2.9	18 21.6	15 15.7	17 17.4	20 22.2	25 6.7	17 18.5 N.
22 16.4	26 11.1	23 22.6	26 0.4	29 15.2	Sept. 2 23.7	24 12.18.
30 5.9	Sept. 3 0.6	Sept. 1 5.6	Sept. 3 7.3	Sept. 7 8.2	11 16.7	31 5.7 N.
Sept. 6 19.3	10 14.1	9 12.5	11 14.2	16 1.2	20 9.6	Sept. 6 23.38.
14 8.8	18 3.6	17 19.4	19 21.2	24 18.1	29 2.6	13 16.9 N.
21 22.3	25 17.0	26 2.4	28 4.1	Oct. 3 11.1	Oct. 7 19.6	20 10.58.
29 11.8	Oct. 3 6.5	Oct. 4 9.3	Oct. 6 11.1	12 4.1	16 12.6	27 4.1 N.
Oct. 7 1.3	10 20.0	12 16.3	14 18.0	20 21.0	25 5.5	Oct. 3 21.78.
14 14.8	18 9.5	22 11.1	23 1.0	29 14.0	Nov. 2 22.5	10 15.2 N.
22 4.2	25 23.0	29 6.2	31 7.9	Nov. 7 7.0	11 15.4	17 8.88.
29 17.7	Nov. 2 12.5	Nov. 6 13.1	Nov. 8 14.8	15 23.9	20 8.4	24 2.4 N.
Nov. 6 7.2	10 1.9	14 20.0	16 21.8	24 16.9	29 1.3	30 20.08.
13 20.7	17 15.4	23 3.0	25 4.7	Dec. 3 9.8	Dec. 7 18.3	Nov. 6 13.6 N.

In the above diagram the central circle represents the planet.

For Ariel every third greatest elongation is given, and for Umbriel every alternate one; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Ariel,  $2^d 12^h.489$ ; of Umbriel,  $4^d 3^h.460$ ; of Titania,  $8^d 16^h.941$ ; of Oberon,  $13^d 11^h.118$ .

Time from Northern Elongation.		Ariel.		Umbriel.		Time from Northern Elongation.		Titania.		Time from Northern Elongation.		Oberon.	
		<i>p</i> <sup>1</sup>	<i>F</i>	<i>p</i> <sup>1</sup>	<i>F</i>			<i>p</i> <sup>1</sup>	<i>F</i>			<i>p</i> <sup>1</sup>	<i>F</i>
d	h	°		°		d	h	°		d	h	°	
0	0	350.2	1.000	350.2	1.000	0	0	350.2	1.000	0	0	350.2	1.000
0	2	355.2	0.982	353.2	0.993	0	5	353.8	0.991	0	8	354.0	0.990
0	4	0.6	0.930	356.3	0.974	0	10	357.6	0.963	0	16	357.8	0.960
0	6	6.8	0.847	359.6	0.942	0	15	1.6	0.918	1	0	2.0	0.912
0	8	14.6	0.741	3.2	0.898	0	20	6.1	0.857	1	8	6.8	0.848
0	10	25.4	0.621	7.1	0.843	1	1	11.4	0.783	1	16	12.5	0.770
0	12	41.2	0.507	11.7	0.780	1	6	17.9	0.700	2	0	19.5	0.682
0	14	64.5	0.429	17.1	0.711	1	11	26.3	0.613	2	8	28.7	0.592
0	16	92.6	0.423	23.7	0.637	1	16	37.3	0.529	2	16	41.0	0.507
0	18	116.8	0.494	32.1	0.564	1	21	52.2	0.459	3	0	57.7	0.443
0	20	133.4	0.606	42.8	0.498	2	2	71.0	0.420	3	8	78.1	0.416
0	22	144.6	0.726	56.4	0.447	2	7	91.6	0.422	3	16	99.0	0.434
1	0	152.8	0.835	72.7	0.418	2	12	110.0	0.466	4	0	116.5	0.493
1	2	159.1	0.922	90.0	0.420	2	17	124.4	0.537	4	8	129.6	0.575
1	4	164.6	0.978	106.0	0.452	2	22	135.2	0.622	4	16	139.4	0.665
1	6	169.6	1.000	119.2	0.507	3	3	143.2	0.710	5	0	146.7	0.753
1	8	174.6	0.986	129.6	0.574	3	8	149.6	0.792	5	8	152.6	0.833
1	10	179.9	0.938	137.7	0.647	3	13	154.8	0.864	5	16	157.5	0.901
1	12	186.0	0.859	144.1	0.720	3	18	159.3	0.924	6	0	161.8	0.953
1	14	193.6	0.755	149.4	0.789	3	23	163.3	0.967	6	8	165.8	0.986
1	16	203.9	0.636	153.9	0.851	4	4	167.0	0.993	6	16	169.5	1.000
1	18	218.9	0.519	157.8	0.904	4	9	170.6	1.000	7	0	173.2	0.994
1	20	241.2	0.435	161.3	0.947	4	14	174.2	0.989	7	8	177.0	0.968
1	22	269.2	0.419	164.5	0.977	4	19	178.0	0.959	7	16	181.2	0.923
2	0	294.2	0.482	167.6	0.995	5	0	182.0	0.912	8	0	185.8	0.862
2	2	311.7	0.591	170.6	1.000	5	5	186.6	0.850	8	8	191.3	0.786
2	4	323.5	0.712	173.6	0.992	5	10	192.1	0.775	8	16	198.0	0.700
2	6	331.9	0.823	176.8	0.970	5	15	198.7	0.691	9	0	206.7	0.609
2	8	338.4	0.913	180.1	0.936	5	20	207.3	0.604	9	8	218.3	0.523
2	10	344.0	0.972	183.7	0.891	6	1	218.7	0.520	9	16	234.1	0.453
2	12	349.0	0.999	187.7	0.835	6	6	234.0	0.454	10	0	253.9	0.418
2	14	354.0	0.990	192.4	0.771	6	11	253.2	0.418	10	8	275.1	0.427
2	16			197.9	0.701	6	16	273.7	0.425	10	16	293.4	0.479
2	18			204.7	0.627	6	21	291.8	0.472	11	0	307.4	0.557
2	20			213.4	0.555	7	2	305.7	0.546	11	8	317.6	0.647
2	22			224.5	0.490	7	7	316.1	0.632	11	16	325.4	0.736
3	0			238.5	0.441	7	12	324.0	0.718	12	0	331.6	0.819
3	2			255.0	0.417	7	17	330.2	0.800	12	8	336.6	0.889
3	4			272.3	0.423	7	22	335.3	0.871	12	16	341.0	0.944
3	6			288.0	0.458	8	3	339.7	0.929	13	0	345.0	0.981
3	8			300.8	0.515	8	8	343.7	0.970	13	8	348.8	0.998
3	10			310.8	0.584	8	13	347.4	0.994	13	16	352.5	0.996
3	12			318.6	0.657	8	18	351.0	1.000				
3	14			324.9	0.730								
3	16			330.0	0.798								
3	18			334.4	0.859								
3	20			338.3	0.911								
3	22			341.7	0.952								
4	0			345.0	0.980								
4	2			348.0	0.997								
4	4			351.0	1.000								

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = \frac{F^2(p)}{p}$ .

FOR GREENWICH MEAN NOON.

Date.	P-P <sub>0</sub> .	$\frac{a(\rho)}{\rho}$				Date.	P-P <sub>0</sub> .	$\frac{a(\rho)}{\rho}$			
		Ariel.	Umbriel.	Titania.	Oberon.			Ariel.	Umbriel.	Titania.	Oberon.
	•	"	"	"	"		•	"	"	"	"
Apr. 20	-0.4	13.0	18.1	29.7	39.7	Aug. 18	0.0	13.9	19.4	31.9	42.6
25	0.5	13.0	18.2	29.8	39.9	23	+0.1	13.9	19.4	31.8	42.6
30	0.5	13.1	18.2	29.9	40.0	28	0.2	13.9	19.4	31.8	42.5
May 5	0.6	13.2	18.3	30.1	40.2	Sept. 2	0.2	13.9	19.4	31.8	42.5
10	0.6	13.2	18.4	30.2	40.4	7	0.3	13.9	19.3	31.7	42.4
15	-0.6	13.3	18.5	30.3	40.5	12	+0.4	13.8	19.3	31.6	42.3
20	0.6	13.3	18.6	30.4	40.7	17	0.4	13.8	19.2	31.6	42.2
25	0.6	13.4	18.6	30.6	40.9	22	0.5	13.8	19.2	31.5	42.1
30	0.6	13.4	18.7	30.7	41.0	27	0.5	13.7	19.1	31.4	42.0
June 4	0.6	13.5	18.8	30.8	41.2	Oct. 2	0.6	13.7	19.1	31.3	41.9
9	-0.6	13.5	18.9	30.9	41.4	7	+0.6	13.6	19.0	31.2	41.7
14	0.6	13.6	18.9	31.0	41.5	12	0.6	13.6	18.9	31.1	41.6
19	0.6	13.6	19.0	31.2	41.7	17	0.6	13.5	18.9	31.0	41.4
24	0.6	13.7	19.1	31.3	41.8	22	0.6	13.5	18.8	30.8	41.2
29	0.5	13.7	19.1	31.4	42.0	27	0.6	13.4	18.7	30.7	41.1
July 4	-0.5	13.8	19.2	31.5	42.1	Nov. 1	+0.6	13.4	18.6	30.6	40.9
9	0.4	13.8	19.2	31.6	42.2	6	0.6	13.3	18.6	30.4	40.7
14	0.4	13.8	19.3	31.6	42.3	11	0.6	13.3	18.5	30.3	40.5
19	0.3	13.9	19.3	31.7	42.4	16	0.6	13.2	18.4	30.2	40.4
24	0.3	13.9	19.4	31.8	42.5	21	0.6	13.1	18.3	30.0	40.2
29	-0.2	13.9	19.4	31.8	42.5	26	+0.5	13.1	18.2	29.9	40.0
Aug. 3	0.2	13.9	19.4	31.8	42.6	Dec. 1	0.5	13.0	18.2	29.8	39.9
8	-0.1	13.9	19.4	31.8	42.6	6	0.4	13.0	18.1	29.7	39.7
13	0.0	13.9	19.4	31.9	42.6	11	+0.4	12.9	18.0	29.6	39.6

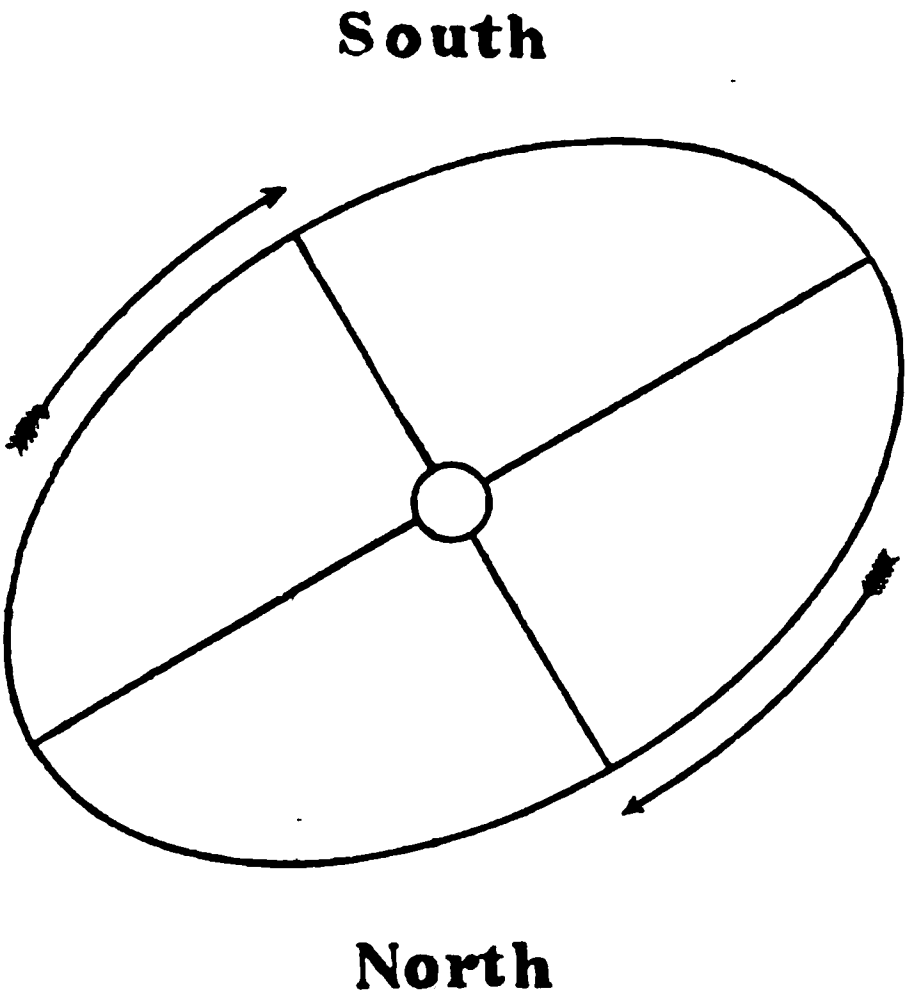
SATELLITE OF NEPTUNE, 1917.

Time from Eastern Elongation.			p <sup>1</sup>	F	Time from Eastern Elongation.			p <sup>1</sup>	F	Date.	P-P <sub>0</sub> .	$\frac{a(\rho)}{\rho}$	Date.	P-P <sub>0</sub> .	$\frac{a(\rho)}{\rho}$
d	h	°			d	h	°								
0	0	120.1	1.000	3	0	297.8	0.999	Jan.	1	+0.7	16.8	May	1	-1.5	16.2
0	3	115.3	0.995	3	3	292.8	0.988		6	0.5	16.8		6	1.4	16.1
0	6	110.3	0.979	3	6	287.8	0.967		11	0.4	16.8		11	1.4	16.1
0	9	105.1	0.953	3	9	282.4	0.937		16	0.2	16.8		16	1.3	16.0
0	12	99.6	0.918	3	12	276.7	0.899		21	+0.1	16.8		21	-1.2	16.0
0	15	93.6	0.877	3	15	270.4	0.855		26	-0.1	16.8	Oct.	2	+3.5	16.0
0	18	86.9	0.831	3	18	263.4	0.807		31	0.2	16.8		7	3.6	16.0
0	21	79.5	0.782	3	21	255.4	0.758	Feb.	5	0.4	16.8		12	3.6	16.1
1	0	71.0	0.734	4	0	246.4	0.712		10	0.6	16.8		17	3.7	16.1
1	3	61.5	0.692	4	3	236.4	0.674		15	0.7	16.8		22	3.8	16.2
1	6	50.8	0.658	4	6	225.2	0.646		20	-0.8	16.7		27	+3.8	16.2
1	9	39.2	0.638	4	9	213.3	0.634		25	1.0	16.7	Nov.	1	3.9	16.3
1	12	27.2	0.634	4	12	201.2	0.638	Mar.	2	1.1	16.7		6	3.9	16.3
1	15	15.3	0.646	4	15	189.6	0.658		7	1.2	16.6		11	3.9	16.4
1	18	4.1	0.673	4	18	179.0	0.691		12	1.3	16.6		16	3.9	16.4
1	21	354.0	0.712	4	21	169.4	0.734		17	-1.4	16.6		21	+3.8	16.5
2	0	345.0	0.758	5	0	160.9	0.781		22	1.5	16.5		26	3.8	16.5
2	3	337.0	0.806	5	3	153.4	0.830		27	1.5	16.5	Dec.	1	3.8	16.5
2	6	330.0	0.854	5	6	146.8	0.877	Apr.	1	1.6	16.5		6	3.7	16.6
2	9	323.7	0.899	5	9	140.8	0.918		6	1.6	16.4		11	3.6	16.6
2	12	317.9	0.937	5	12	135.2	0.953		11	-1.6	16.4		16	+3.5	16.6
2	15	312.6	0.967	5	15	130.0	0.979		16	1.6	16.3		21	3.4	16.7
2	18	307.5	0.988	5	18	125.1	0.994		21	1.6	16.3		26	3.3	16.7
2	21	302.6	0.999	5	21	120.2	1.000		26	-1.6	16.2		31	+3.2	16.7

Position angle of satellite  $p=p^1+(P-P_0)$ .

Apparent distance of satellite  $s=\frac{F^2a(\rho)}{\rho}$ .

APPARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF OPPOSITION,  
JANUARY 23, 1917, AS SEEN IN AN INVERTING TELESCOPE.



Date.	Position Angle of Apsis.	Apparent Distance at Apsis.
Jan. 23	120.1	16.8
May 3	118.7	16.2
Oct. 14	123.8	16.1
Dec. 33	123.2	16.7

GREENWICH MEAN TIME OF GREATEST ELONGATION.

East.		West.		East.		West.		East.		West.	
Jan. d h		Jan. d h		Mar. d h		Mar. d h		Oct. d h		Oct. d h	
2 0 2		4 22.8		25 7.8		28 6.4		11 1.2		13 23.7	
7 21.3		10 19.9		31 4.9		3 3 4		16 22.2		19 20.7	
13 18.5		16 17 0		Apr. 6 2.0		9 0 5		22 19.2		25 17.7	
19 15 6		22 14 1		11 23.0		14 21.6		28 16.2		31 14.7	
25 12.7		28 11.3		17 20.1		20 18.6		Nov. 3 13.2		Nov. 6 11.7	
31 9 8		Feb. 3 8 4		23 17.1		26 15.7		9 10.3		12 8.8	
Feb. 6 6 9		9 5 5		29 14.2		May 2 12.7		15 7.3		18 5.8	
12 4.1		15 2.6		May 5 11.2		8 9.7		21 4.3		24 2.9	
18 1.2		20 23 8		11 8.2		14 6.7		27 1.4		29 23.9	
23 22 3		26 20.9		17 5.2		20 3 7		Dec. 2 22.5		Dec. 5 21.0	
Mar. 1 19 4		Mar. 4 18.0		23 2.2		26 0.7		8 19.5		11 18.1	
7 16 5		10 15.1		28 23.2		31 21.7		14 16.6		17 15.1	
13 13 6		16 12.2		Oct. 5 4.2		Oct. 8 2 7		20 13.7		23 12.2	
19 10.7		22 9 3						26 10.8		29 9.3	

In the above diagram the central circle represents the planet.  
The sidereal period of the satellite of Neptune is 5<sup>d</sup> 21<sup>h</sup>.044.

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MEAN TIME.

PLANETARY

TIONS.

No.	Place.	Latitude.	Reduction to Geo- centric Latitude.	Altitude (Meters).	Log $\rho$ (including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" ' "	" "			h m s	s
1	Abbadia, France . . .	+43 22 52.2	-11 34.4	69	9.999317	+ 0 7 0.1	+ 1.15
2	Adelaide, S. Australia .	-34 55 38.0 <sup>a</sup>	+10 52.4	41 <sup>b</sup>	9.999526	- 9 14 20.07 <sup>a</sup>	- 91.06
3	Adelaide, S. Australia .	-34 55 37.4 <sup>c</sup>	+10 52.4	. . .	9.999523	- 9 14 20.17 <sup>c</sup>	- 91.06
4	Albany, N. Y. . . .	+42 39 12.7 <sup>a</sup>	-11 33.1	70 <sup>a</sup>	9.999335	+ 4 55 7.12 <sup>a</sup>	+ 48.48
5		+42 39 49.5 <sup>a</sup>	-11 33.1	52	9.999335	+ 4 54 59.97 <sup>a</sup>	+ 48.46
6		+36 47 50	-11 6.7	342	9.999501	- 0 12 8.38	- 1.99
7		+40 28 58.1 <sup>d</sup>	-11 26.7	370 <sup>d</sup>	9.999411	+ 5 20 5.39 <sup>d</sup>	+ 52.58
8		+40 27 41.6	-11 26.6	. . .	9.999387	+ 5 20 2.93	+ 52.58
9		+42 21 56.5 <sup>e</sup>	-11 32.5	110 <sup>e</sup>	9.999345	+ 4 50 5.93 <sup>e</sup>	+ 47.66
10		+42 22 17.1 <sup>f</sup>	-11 32.5	. . .	9.999338	+ 4 50 4.67 <sup>f</sup>	+ 47.65
11		+42 16 48.7 <sup>a</sup>	-11 32.3	282 <sup>a</sup>	9.999380	+ 5 34 56.27 <sup>a</sup>	+ 55.02
12		+44 15 39.2 <sup>g</sup>	-11 35.4	242	9.999307	+ 5 53 35.92 <sup>g</sup>	+ 58.09
13		+43 45 14.4	11 34.9	184	9.999316	- 0 45 1.30	- 7.40
14		-16 22 28.0 <sup>h</sup>	+ 6 15.2	2451 <sup>h</sup>	0.000022	+ 4 46 11.73 <sup>h</sup>	+ 47.02
15		+54 21 12.7 <sup>c</sup>	-10 59.6	61 <sup>c</sup>	9.999040	+ 0 26 35.4 <sup>c</sup>	+ 4.37
16		+37 58 19.7 <sup>i</sup>	-11 14.3	107 <sup>i</sup>	9.999456	- 1 34 53 <sup>i</sup>	- 15.59
17		+39 17 52.0 <sup>j</sup>	-11 21.5	36 <sup>j</sup>	9.999418	+ 5 6 29.1 <sup>j</sup>	+ 50.35
18		+49 53 6.0 <sup>c</sup>	-11 26.0	299 <sup>c</sup>	9.999167	- 0 43 33.57 <sup>c</sup>	- 7.16
19		+41 25 18	-11 30.0	420	9.999391	- 0 8 28.0	- 1.39
20		+42 30 8.4	-11 32.8	. . .	9.999335	+ 5 56 7.4	+ 58.50
21		+53 28 46.2	-11 6.1	35	9.999000	- 0 40 57.74	- 6.73
22		+37 52 23.6	-11 13.7	97	9.999458	+ 8 9 2.72	+ 80.34
23		+52 30 16.7 <sup>k</sup>	-11 12.5	47 <sup>k</sup>	9.999085	- 0 53 34.80 <sup>k</sup>	- 8.80
24		+52 31 13.1	-11 12.4	. . .	9.999081	- 0 53 34.41	- 8.80
25		+52 31 30.7	-11 12.4	. . .	9.999081	- 0 53 27.40	- 8.78
26		+52 29 7	-11 12.6	99	9.999084	- 0 53 54.2	- 8.86
27		+46 57 8.7	-11 34.2	573	9.999260	- 0 29 45.70 <sup>a</sup>	- 4.89
28		+47 14 59.0	-11 33.7	119	9.999235	- 0 23 57.13	- 3.93
29		+53 5 47	-11 8.7	50	9.999071	+ 0 31 40.9	+ 5.20
30		+39 9 56 <sup>d</sup>	-11 20.8	238 <sup>d</sup>	9.999435	+ 5 46 5 <sup>d</sup>	+ 56.85
31		+ 4 35 55.2 <sup>c</sup>	- 1 50.8	2634	0.000170	+ 4 56 23.5	+ 48.69
32		+18 53 36.2 <sup>c</sup>	- 7 5.1	14 <sup>c</sup>	9.999849	- 4 51 15.72 <sup>c</sup>	- 47.85
33		+50 43 45.0 <sup>k</sup>	-11 22.3	62 <sup>i</sup>	9.999130	- 0 28 23.17 <sup>k</sup>	- 4.66
34		+44 50 7.2 <sup>a</sup>	-11 35.6	73	9.999281	+ 0 2 5.51 <sup>a</sup>	+ 0.94
35		+42 20 58 <sup>m</sup>	-11 32.5	31 <sup>m</sup>	9.999341	+ 4 44 19.1 <sup>m</sup>	+ 46.71
36		+42 21 32.5	-11 32.5	48	9.999342	+ 4 44 15.0	+ 46.70
37		+54 12 9.6 <sup>n</sup>	-11 0.8	32 <sup>n</sup>	9.999042	- 0 40 31.02 <sup>n</sup>	- 6.66
38		+53 4 36	-11 8.8	. . .	9.999067	- 0 35 15	- 5.79
39		+51 6 55.8 <sup>k</sup>	-11 20.4	147 <sup>k</sup>	9.999126	- 1 8 8.72 <sup>k</sup>	- 11.20
40		-27 28 0.0	+ 9 28.3	. . .	9.999691	-10 12 6.17	-100.55
41		+50 47 55.5 <sup>a</sup>	-11 21.9	105 <sup>a</sup>	9.999131	- 0 17 26.05 <sup>a</sup>	- 2.86
42		+50 51 10.6 <sup>c</sup>	-11 21.7	. . .	9.999123	- 0 17 28.02 <sup>c</sup>	- 2.87
43		+47 29 34.7 <sup>c</sup>	-11 33.2	131 <sup>c</sup>	9.999217	- 1 16 15.3 <sup>c</sup>	- 12.53
44		+52 12 51.6	-11 14.3	28	9.999091	- 0 0 22.75	- 0.06
45		+42 22 47.6 <sup>a</sup>	-11 32.6	24	9.999340	+ 4 44 31.05 <sup>a</sup>	+ 46.74
46		-33 56 3.5 <sup>p</sup>	+10 43.6	13 <sup>p</sup>	9.999548	- 1 13 54.76 <sup>p</sup>	- 12.14
47		+39 8 8.9 <sup>q</sup>	-11 20.7	18 <sup>q</sup>	9.999421	- 0 33 14.9 <sup>q</sup>	- 5.46
48		+37 30 13.2 <sup>c</sup>	-11 11.4	49 <sup>c</sup>	9.999464	- 1 0 20.70 <sup>c</sup>	- 9.91
49		+50 0 9.9 <sup>a</sup>	11 25.5	138 <sup>r</sup>	9.999153	- 2 24 55.75 <sup>a</sup>	- 23.81
50		+38 2 1.2 <sup>e</sup>	-11 14.6	259 <sup>e</sup>	9.999465	+ 5 14 5.33 <sup>e</sup>	+ 51.60

<sup>a</sup> Center of dome.  
<sup>b</sup> Transit pier.  
<sup>c</sup> Circle Syngros.  
<sup>d</sup> Center of instrument house.  
<sup>e</sup> Center of observatory.  
<sup>f</sup> Floor of meridian room.

<sup>m</sup>  
<sup>n</sup>  
<sup>o</sup>  
<sup>p</sup>  
<sup>q</sup>  
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Univ. of Pittsburgh.

1884,  
1-1908.

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c  
d  
e



No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters)	Log $\rho$ (including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" "	" "			h m s	s
51	Chicago, Ill.	+41 50 1.0	-11 31.2	...	9.999352	+5 50 26.84	+57.57
52	Christiania, Norway	+59 54 44.0 <sup>a</sup>	-10 4.6	25 <sup>a</sup>	9.998908	-0 42 53.50 <sup>a</sup>	- 7.06
53	Cincinnati, Ohio	+39 8 19.8 <sup>b</sup>	-11 20.7	247 <sup>b</sup>	9.999437	+5 37 41.40 <sup>b</sup>	+55.52
54	Cincinnati, Ohio	+39 8 26.5	-11 20.5	...	9.999437	+5 37 59.00	+55.52
55	Cleveland, Ohio	+41 30 14.5 <sup>c</sup>	-11 30.2	215 <sup>c</sup>	9.999375	+5 26 25.86 <sup>c</sup>	+53.62
56	Clinton, N. Y.	+43 3 17.0	-11 33.9	276	9.999340	+5 1 37.45	+49.55
57	Coimbra, Portugal	+40 12 24.5	-11 25.6	99	9.999400	+0 33 43.1	+ 5.54
58	Columbia, Mo.	+38 56 51.7 <sup>d</sup>	-11 19.7	225 <sup>c</sup>	9.999440	+6 9 18.33 <sup>d</sup>	+60.67
59	Columbus, Ohio	+39 59 50.4 <sup>d</sup>	-11 24.7	233 <sup>d</sup>	9.999414	+5 32 2.60 <sup>d</sup>	+54.55
60	Copenhagen, Denmark	+55 41 12.6	-10 48.6	14	9.999005	-0 50 18.69 <sup>f</sup>	- 8.26
61	Cordova, Arg. Rep.	-31 25 15.5 <sup>g</sup>	+10 18.0	434 <sup>g</sup>	9.999334	+4 16 48.22 <sup>g</sup>	+42.19
62		+50 3 52.0 <sup>a</sup>	-11 25.2	221 <sup>a</sup>	9.999157	-1 19 50.27 <sup>a</sup>	-13.12
63		+54 21 18.0	-10 59.6	3	9.999030	-1 14 39.6	-12.26
64		+30 18 51.8 <sup>h</sup>	-10 5.3	681 <sup>h</sup>	9.999676	-5 12 11.76 <sup>h</sup>	-51.29
65		+39 40 36.4 <sup>a</sup>	-11 23.3	1644 <sup>i</sup>	9.999516	+6 59 47.72 <sup>a</sup>	+68.96
66		+41 36 0	-11 30.5	296	9.999378	+6 14 30.56	-41.03
67	Russia	+58 22 47.2 <sup>a</sup>	-10 22.1	67 <sup>a</sup>	9.999045	-1 46 53.22 <sup>a</sup>	-17.56
68		+51 2 16.8	-11 20.8	121	9.999126	-0 54 54.74	- 9.62
69		+53 23 13.1 <sup>a</sup>	-11 6.7	86 <sup>a</sup>	9.999066	+0 25 21.1 <sup>a</sup>	+ 4.16
70	nd	+57 9 36	-10 34.8	141	9.998979	+0 9 40.0	+ 1.59
71	Durham, England	+54 46 6.2 <sup>j</sup>	-10 56.4	107 <sup>k</sup>	9.999033	+0 6 19.75 <sup>j</sup>	+ 1.04
72	Dusseldorf, Prussia	+51 12 25.0 <sup>l</sup>	-11 19.9	46 <sup>l</sup>	9.999117	-0 27 2.69 <sup>l</sup>	- 4.44
73	Edinburgh, Scotland	+55 55 30.0 <sup>a</sup>	-10 46.5	134 <sup>m</sup>	9.999007	+0 12 44.22 <sup>a</sup>	+ 2.00
74	Edinburgh, Scotland	+55 57 23.2 <sup>m</sup>	-10 46.2	106 <sup>o</sup>	9.998995	+0 12 43.05 <sup>m</sup>	+ 2.00
75	Elmira, N. Y.	+42 6 25	-11 31.9	...	9.999345	+5 7 13.90	+50.47
76	Evanston, Ill.	+42 3 33.4	-11 31.8	175	9.999358	+5 50 42.3	+57.61
77		+35 12 30.5	-10 54.7	2210	9.999667	+7 26 44.58	+73.39
78		+39 8 13.2 <sup>r</sup>	-11 20.7	165	9.999437	+5 8 47.73	+50.73
79		+42 52 46.2	-11 33.6	152	9.999336	+5 8 1.00	+50.60
80	Geneva, Switzerland	+46 11 59.3 <sup>a</sup>	-11 35.2	407 <sup>a</sup>	9.999208	-0 24 36.61 <sup>a</sup>	- 4.64
81	Genoa, Italy	+44 25 9.3 <sup>a</sup>	-11 35.5	105	9.999290	-0 35 41.28 <sup>a</sup>	- 5.96
82	Georgetown, D. C.	+38 54 26.7 <sup>b</sup>	-11 19.5	47	9.999429	+5 8 18.26 <sup>b</sup>	+50.65
83	Glasgow, Mo.	+39 13 45.6	-11 21.1	227	9.999433	+6 11 18.08	+41.09
84	Glasgow, Scotland	+55 52 42.8 <sup>a</sup>	-10 46.9	55 <sup>p</sup>	9.999003	+0 17 10.55 <sup>a</sup>	+ 2.32
85	Gotha, Germany	+50 56 37.9 <sup>l</sup>	-11 21.2	322 <sup>a</sup>	9.999142	-0 42 50.51 <sup>l</sup>	- 7.04
86	Gotha, Germany	+50 56 4.4 <sup>j</sup>	-11 21.2	360 <sup>j</sup>	9.999145	-0 42 55.09 <sup>j</sup>	- 7.05
87		+51 31 48.1 <sup>q</sup>	-11 18.2	161 <sup>q</sup>	9.999116	-0 39 46.22 <sup>q</sup>	- 6.53
88		+39 38 46.6 <sup>a</sup>	-11 23.1	262 <sup>a</sup>	9.999425	+5 47 24.36 <sup>a</sup>	+57.67
89		+51 28 38.2 <sup>a</sup>	-11 18.5	49 <sup>a</sup>	9.999110	0 0 0.00 <sup>a</sup>	0.00
90		+53 33 6.0	-11 5.6	25	9.999067	-0 39 53.60 <sup>a</sup>	- 6.55
91	Germany	+53 32 51.3 <sup>d</sup>	-11 5.6	30 <sup>d</sup>	9.999058	-0 39 53.46 <sup>d</sup>	- 6.55
92		+43 42 15.3	-11 34.8	183	9.999317	+4 49 8.02	+47.59
93	Haverford, Pa.	+40 0 40.1 <sup>r</sup>	-11 24.8	...	9.999388	+5 1 12.70 <sup>r</sup>	+49.48
94	Heidelberg, Baden	+49 23 55.2 <sup>a</sup>	-11 27.8	567 <sup>s</sup>	9.999198	-0 34 53.13 <sup>a</sup>	- 5.73
95	Heidelberg, Baden	+49 23 55.7 <sup>t</sup>	-11 27.8	570 <sup>t</sup>	9.999198	-0 34 52.96 <sup>t</sup>	- 5.73
96	Heidelberg, Baden	+49 24 34.3 <sup>l</sup>	-11 27.8	126 <sup>l</sup>	9.999168	-0 34 46.80 <sup>l</sup>	- 5.71
97	Helsingfors, Finland	+60 9 42.3 <sup>a</sup>	-10 1.5	33 <sup>a</sup>	9.999003	-1 39 49.10 <sup>a</sup>	-16.40
98	Herény, Hungary	+47 15 47.4	-11 33.7	229	9.999229	-1 6 24.7	-10.91
99	Hong Kong, China	+22 18 13.2 <sup>j</sup>	- 8 7.4	33 <sup>j</sup>	9.999793	-7 36 41.86 <sup>j</sup>	-75.01
100	Iowa City, Iowa	+41 40 0	-11 30.7	183	9.999300	+6 6 6	+41.14

<sup>a</sup> Meridian circle.<sup>b</sup> Center of dome.<sup>c</sup> Zenith telescope pier.<sup>d</sup> Transit pier.<sup>e</sup> Observatory bench mark.<sup>f</sup> Center of observatory.<sup>g</sup> Old meridian circle.<sup>h</sup> Floor-level of zenith sector pillar.<sup>i</sup><sup>j</sup><sup>k</sup><sup>l</sup><sup>m</sup><sup>n</sup>

room.

room transit in-  
strument and mural circle.<sup>o</sup><sup>p</sup><sup>q</sup><sup>r</sup><sup>s</sup><sup>t</sup><sup>u</sup><sup>v</sup> Bruce telescope.

room.

before 1880.

rela.

No.	Authority for—		Description.
	Latitude.	Longitude.	
51	U. S. Lake Survey, 1864.	Smithsonian Report, 1886.	<sup>a</sup> Dearborn Observatory.
52	<i>Astron. Nach.</i> , Nr. 3193, 1893.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
53	<i>Publications of the Obs.</i> , 1908.	<i>Astronomical Journal</i> , 1897.	Cincinnati Obs., since 1873.
54	Letter from Director, 1897.	<i>Astronomical Journal</i> , 1854.	Cincinnati Obs. before 1873.
55	Letter from Director, 1913.	Letter from Director, 1913.	Case Obs., Case School of Appl'd Sci.
56	<i>Astron. Nach.</i> , Nr. 2553, 1883.	<i>Astron. Nach.</i> , Nr. 2553, 1883.	Litchfield Obs., Hamilton College.
57	<i>Eph. Astron. de Coimbra</i> , 1889.	<i>Eph. Astron. de Coimbra</i> , 1889.	University Observatory.
58	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	Laws Obs., Univ. of Mo.
59	Letter from Director, 1913.	Letter from Director, 1899.	McMillin Obs., State Univ.
60	British Nautical Almanac.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
61	<i>Resultados del Obs.</i> , 1887.	<i>Resultados del Obs.</i> , 1887.	National Observatory.
62	Letter from Director, 1913.	Letter from Director, 1913.	Imperial and Royal Obs.
63	Letter from Director, 1897.	Letter from Director, 1897.	Obs. of the School of Navigation.
64	<i>Great Trig. Survey of India</i> , 1906.	Letter from Supt. of Survey, 1913.	Halg Obs., Trig. Survey of India.
65	Letter from Director, 1913.	Letter from Director, 1913.	Chamberlin Obs., Univ. of Denver.
66	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Drake Univ. Obs.
67	<i>Publikationen der Sternw.</i> , 1911.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
68	<i>Berliner Jahrbuch</i> .	<i>Berliner Jahrbuch</i> .	<sup>b</sup> Baron Engelhardt's Obs.
69	<i>Trans. Royal Dublin Soc.</i> , 1889.	<i>Trans. Royal Irish Acad.</i> , 1838.	Dunsink Obs., Trinity College.
70	Letter from Royal Astronomer, 1897.	Letter from Royal Astronomer, 1897.	<sup>c</sup> Lord Crawford's Obs.
71	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
72	<i>Astron. Nach.</i> , Nr. 643, 1848.	Letter from Director, 1913.	Municipal Obs., Bilk.
73	<i>Monthly Notices, R. A. S.</i> , 1907.	Letter from Director, 1913.	Royal Obs. since 1895; Blackford Hill.
74	<i>Monthly Notices, R. A. S.</i> , 1896.	<i>Edinburgh Observations</i> , 1858.	<sup>d</sup> Royal Obs. before 1895; Calton Hill.
75	Letter from Director, 1912.	Letter from Director, 1912.	Elmira College Obs.
76	Letter from Director, 1893.	Letter from Director, 1893.	Dearborn Obs., North Western Univ.
77	British Nautical Almanac.	British Nautical Almanac.	Lowell Observatory.
78	See footnote (j).	See footnote (k).	International Lat. Obs.
79	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Smith Observatory.
80	<i>Memoire par J. Pidoux</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Municipal Observatory.
81	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Hydrographic Institute.
82	See footnote (e).	See footnote (e).	Georgetown College Obs.
83	<i>Astron. Nach.</i> , Nr. 2625, 1884.	<i>Washington Observations</i> , 1877.	Morrison Observatory.
84	<i>First Glasgow Catalogue</i> , 1870.	<i>Monthly Notices, R. A. S.</i> , 1865.	University Observatory.
85	Letter from Director, 1913.	Letter from Director, 1913.	Ducal Obs. since 1857.
86	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Ducal Obs. before 1857.
87	<i>Astron. Nach.</i> , Nr. 4428, 1910.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
88	Letter from Director, 1912.	Letter from Director, 1912.	McKim Obs., De Pauw Univ.
89	<i>Greenwich Observations</i> , 1910.	<i>Greenwich Observations</i> , 1910.	<sup>f</sup> Royal Observatory.
90	Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>g</sup> Hamburg Observatory before 1909.
91	Letter from Director, 1913.	Letter from Director, 1913.	<sup>h</sup> Imperial Marine Obs.
92	Letter from Director, 1894.	Letter from Director, 1894.	Shattuck Obs., Dartmouth College.
93	<i>Proc. Amer. Ph. Soc.</i> , 1883.	<i>Proc. Amer. Ph. Soc.</i> , 1883.	Haverford College Obs.
94	Letter from Director, 1913.	Letter from Director, 1913.	Astron. Institute, Königstuhl Obs.
95	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	Astrophys. Inst., Königstuhl Obs.
96	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	<sup>i</sup> Dr. Wolf's Obs. before 1898.
97	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
98	<i>Astron. Nach.</i> , Nr. 2633, 1884.	British Nautical Almanac.	Astrophysical Observatory.
99	<i>Hong Kong Observations</i> , 1897.	Letter from Director, 1897.	Colonial Observatory.
100	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs., Univ. of Iowa.

<sup>a</sup> Transferred to Evanston, Ill., in 1887.

<sup>b</sup> Instruments transferred to Univ. of Kasan in 1897.

<sup>c</sup> Instruments transferred to Royal Obs. at Edinburgh in 1896.

<sup>d</sup> City Obs. since 1896.

<sup>e</sup> Based upon data from the U. S. C. and G. Survey.

<sup>f</sup> Point of reference before 1851, 7½ ft. N., 19 ft. W.

<sup>g</sup> At Bergedorf since 1909.

<sup>h</sup> Transit instrument before 1908, 0' 5 N., 0° 04 W.

<sup>i</sup> Instruments transferred to the Astrophysical Institute of the Königstuhl Obs. in 1898.

<sup>j</sup> *Resultate des Internationalen Breitendienstes*, 1900-1908.

<sup>k</sup> *Resultate des Internationalen Breitendienstes*, Band I, 1903.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" ' "	" "			h m s	"
101	Ithaca, N. Y. . . . .	+42 26 47.3 <sup>a</sup>	-11 32.6	256 <sup>a</sup>	9.999164	+5 5 55.99 <sup>a</sup>	+50.26
102	Ithaca, N. Y. . . . .	+42 26 51.4	-11 32.6		9.999137	+5 5 56.47	+50.26
103	es . . . . .	+18 24 51 <sup>b</sup>	- 0 55.9	540 <sup>b</sup>	9.999892	+5 11 29.48 <sup>b</sup>	+51.17
104		+50 55 34.9 <sup>c</sup>	-11 21.3	165 <sup>c</sup>	9.999132	-0 46 20.22 <sup>c</sup>	- 7.61
105	Jena, . . . . .	+50 55 35.8	-11 21.3	155	9.999131	-0 46 20.31	- 7.61
106	Jena, . . . . .	+50 56 11.0	-11 21.3	174	9.999133	-0 46 20.73	- 7.61
107	I . . . . .	-26 10 54.6 <sup>d</sup>	+ 9 9.8	1804 <sup>d</sup>	9.999440	-1 52 18.0 <sup>d</sup>	-18.45
108	Kalocsa, Hungary . . .	+46 31 41.7 <sup>b</sup>	-11 34.8	117 <sup>e</sup>	9.999240	-1 15 54.12 <sup>b</sup>	-12.47
109	Kasan, Russia . . . .	+55 50 20.0 <sup>f</sup>	-10 47.3	98 <sup>f</sup>	9.999007	-3 15 15.61 <sup>f</sup>	-32.28
110	Kasan, Russia . . . .	+55 47 23.9 <sup>g</sup>	-10 47.7	79 <sup>g</sup>	9.999007	-3 16 29.00 <sup>g</sup>	-32.28
111	Kew, England . . . . .	+51 28 6	-11 18.5	10	9.999108	+0 1 15.1	+ 0.21
112	Kief, Russia . . . . .	+50 27 10.0 <sup>w</sup>	-11 23.5	179 <sup>f</sup>	9.999145	-2 2 0.56 <sup>f</sup>	-37.04
113	a . . . . .	+54 20 27.6 <sup>f</sup>	-10 59.7	52 <sup>f</sup>	9.999340	-0 40 35.45 <sup>f</sup>	- 6.67
114		+47 41 54.8	-11 32.8		9.999202	-1 18 11.7	-12.85
115		+54 42 50.5 <sup>f</sup>	-10 56.8	24 <sup>f</sup>	9.999029	-1 21 58.97 <sup>f</sup>	-13.47
116		+48 3 23.1 <sup>f</sup>	-11 32.0	384 <sup>f</sup>	9.999220	-0 56 31.58 <sup>f</sup>	- 9.29
117		-34 54 31.8 <sup>h</sup>	+10 52.2	18 <sup>h</sup>	9.999525	+3 51 44.8 <sup>h</sup>	+38.07
118		+52 9 19.8 <sup>f</sup>	-11 14.6	6 <sup>f</sup>	9.999000	-0 17 56.15 <sup>f</sup>	- 2.95
119	Leipzig, Saxony . . . .	+51 20 5.9 <sup>i</sup>	-11 19.2	119 <sup>i</sup>	9.999118	-0 49 33.92 <sup>i</sup>	- 8.14
120	Leipzig, Saxony . . . .	+51 20 20.1	-11 19.2		9.999110	-0 49 29.92	- 8.13
121	Liege, Belgium . . . . .	+50 37 6	-11 22.8	127	9.999137	-0 22 15.44	- 3.66
122	Lisbon (Tapada), Portugal	+38 42 30.5 <sup>f</sup>	-11 18.5	95 <sup>f</sup>	9.999437	+0 36 44.68 <sup>f</sup>	+ 6.04
123	Liverpool, England . . .	+53 24 4.8	-11 6.6	61	9.999064	+0 12 17.33	+ 2.02
124	Liverpool, England . . .	+53 24 47.8	-11 6.5		9.999059	+0 12 0.11	+ 1.97
125	Lund, Sweden . . . . .	+56 41 51.6 <sup>i</sup>	-10 48.5	38	9.999000	-0 52 44.97 <sup>i</sup>	- 8.67
126	Lund, Sweden . . . . .	+55 52 12.0	-10 47.0		9.999000	-0 52 47.50	- 8.67
127	Austria . . . . .	+44 32 11.0	-11 35.5	42	9.999280	-0 57 52.41	- 9.51
128		+45 41 41.0	-11 35.5	299	9.999274	-0 19 8.52 <sup>k</sup>	- 3.14
129		+43 4 36.8 <sup>f</sup>	-11 33.9	292 <sup>i</sup>	9.999340	+5 57 37.90 <sup>f</sup>	+58.75
130		+13 4 8.0 <sup>f</sup>	- 5 5.5	7	9.999926	-5 20 59.14	-52.73
131	Madrid, Spain . . . . .	+40 24 30.0 <sup>m</sup>	-11 26.4	655 <sup>m</sup>	9.999433	+0 14 45.09 <sup>m</sup>	+ 2.42
132	P. I. . . . .	+14 34 41	- 5 38.2	3	9.999009	-8 3 54.2	-79.48
133	Cal. . . . .	+38 5 55.8 <sup>n</sup>	-11 15.0	18 <sup>n</sup>	9.999447	+8 9 5.63 <sup>n</sup>	+80.35
134		+54 10 31.8	-11 1.0	45	9.999044	+0 33 48.4	+ 5.55
135	Marseilles, France . . .	+43 18 19 <sup>f</sup>	-11 34.3	75 <sup>o</sup>	9.999320	-0 21 34.55 <sup>f</sup>	- 3.54
136	Marseilles, France . . .	+43 17 52	-11 34.3	57	9.999317	-0 21 28.1	- 3.53
137	Mauritius (Port Louis) .	-20 5 39	+ 7 27.7	54	9.999392	-3 50 12.6	-37.82
138		-37 49 53.2 <sup>p</sup>	+11 13.4	28 <sup>q</sup>	9.999454	-9 39 53.92 <sup>p</sup>	-95.26
139		+48 48 18	-11 29.8	162	9.999185	-0 8 55.6	- 1.47
140	Middletown, Conn. . . .	+41 33 16.0	-11 30.4		9.999359	+4 50 37.18	+47.74
141		+45 27 59.3	-11 35.6	120	9.999288	-0 36 45.88 <sup>q</sup>	- 6.04
142		+44 58 40.0 <sup>r</sup>	-11 35.7	260 <sup>r</sup>	9.999290	+6 12 56.84 <sup>r</sup>	+61.27
143		+39 8 3.6 <sup>x</sup>	-11 20.7	62	9.999424	-9 24 30.75	-92.74
144		+44 38 51.4	-11 35.6	64	9.999285	-0 43 43.40	- 7.18
145		+45 30 20 <sup>s</sup>	-11 35.6	57 <sup>s</sup>	9.999262	+4 54 18.63 <sup>s</sup>	-45.55
146	Russia . . . . .	+55 45 19.5	-10 48.0	150 <sup>f</sup>	9.999012	-2 30 17.03 <sup>f</sup>	-24.60
147	Cal. . . . .	+37 20 25.6 <sup>r</sup>	-11 10.4	1284 <sup>r</sup>	9.999552	+8 6 34.89 <sup>r</sup>	+79.93
148	Mount Wilson, Cal. . . .	+34 12 59.5 <sup>t</sup>	-10 46.2	1799 <sup>t</sup>	9.999608	+7 52 14.33 <sup>t</sup>	+77.58
149	Mount Wilson, Cal. . . .	+34 12 55	-10 46.1	1727 <sup>u</sup>	9.999658	+7 52 14.3	+77.58
150	Munich, Bavaria . . . .	+48 8 45.5 <sup>v</sup>	-11 31.7	529 <sup>v</sup>	9.999287	-0 46 26.02 <sup>v</sup>	- 7.63

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Authority for—		Description.
Latitude.	Longitude.	
Letter from the Dean, 1913. Letter from the Dean, 1913. <i>Memoirs, R. A. S.</i> , 1879. Letter from Director, 1913. Letter, Director new Obs., 1913.	Letter from the Dean, 1913. Letter from the Dean, 1913. See footnote (c). Letter from Director, 1913. Letter, Director new Obs., 1913.	<sup>a</sup> Fuertes Obs., Cornell Univ. <sup>b</sup> Fuertes Obs., Cornell Univ. Mr. Hall's Obs., Montego Bay. Univ. Obs., since 1888. Univ. Obs., before 1888.
<i>V. J. S. Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Letter from Director, 1913. Publications of the Obs., 1911.	<i>V. J. S. Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Publications of the Obs., 1911. Letter from Director, 1913.	The late Dr. Winkler's Obs. Union Obs., formerly Transvaal Obs. Archiepiscopal Haynald Obs. Engelhardt Obs., Univ. of Kasan. University Observatory.
Letter from Director, 1897. <i>Annales de l' Obs.</i> , Vol. IV, 1893. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913.	Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Meteorological Obs., London. Imperial Univ. Obs. <sup>d</sup> Royal University Obs. Near Aszöd, Hungary. Royal University Obs.
Letter from Director, 1897. Letter from Director, 1913. Letter from Director, 1913. Letter from Director, 1913. Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter, Director new Obs., 1913.	Obs. of the Benedictines. National Univ. Obs. University Observatory. University Obs., since 1861. University Obs., before 1861.
<i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Monthly Notices, R. A. S.</i> , 1894. British <i>Nautical Almanac</i> , 1872. Letter from Director, 1913.	<i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3202, 1893. <i>Monthly Notices, R. A. S.</i> , 1894. British <i>Nautical Almanac</i> , 1872. <i>Astron. Nach.</i> , Nr. 3993, 1905.	University Obs., Cointe. Obs. of Lisbon. Bidston, Birkenhead, since 1867. Liverpool Obs., before 1867. Royal Univ. Obs., since 1867.
Letter, Director new Obs., 1913. Letter from Director, 1897. Letter from Director, 1897. Publications of the Obs., 1892. <i>Great Trig. Survey of India</i> , 1906.	Letter, Director new Obs., 1913. Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3202, 1893. Letter from Director, 1912. <i>Great Trig Survey of India</i> , 1901.	Royal Univ. Obs., before 1867. Manora Observatory. Obs. of the Univ., St. Genis Laval. Washburn Obs., Univ. of Wis. Obs. founded by East India Co.
<i>Annuario del Obs.</i> , 1912. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 758, 1851. Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Lick Obs. Bulletin</i> , 1908. British <i>Nautical Almanac</i> , 1901. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Astron. and Meteorolog. Obs. Meteorological Observatory. Chronom. and Time Sta., Navy Yd. Col. Cooper's Observatory. See footnote (c).
Letter, Director new Obs., 1913. Mag. and Meteor. <i>Results</i> , 1908. <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894.	Letter, Director new Obs., 1913. Mag. and Meteor. <i>Results</i> , 1908. <sup>i</sup> <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894.	See footnote (f). Royal Alfred Obs. <sup>g</sup> Government Observatory. Seine-et-Oise, near Paris. Wesleyan University Obs.
<i>Pubbl. del R. Osserv.</i> , 1914. Letter from Director, 1913. See footnote (h). Letter from Director, 1913. Letter from Director, 1912.	<i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>U. S. C. and G. S. Report</i> , 1897.	Royal Observatory, Brera. Obs. Univ. of Minn. International Lat. Obs. Royal Univ. Geophysical Obs. McGill University Obs.
<i>Les Obs. Astron.</i> , Bruxelles, 1907. Publications of the Obs., 1900. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905. <i>U. S. C. and G. S. Report</i> , 1897. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of the Imperial Univ. Lick Obs., Univ. of Cal. Solar Obs., Carnegie Inst. Branch of Smithsonian. Astrophys. Obs. Royal Observatory.

<sup>a</sup> Since 1902.<sup>b</sup> Before 1902.<sup>c</sup> *British Report on Transit of Venus*, 1882.<sup>d</sup> Old position of meridian circle, 0'.9 N., 0".12 E.<sup>e</sup> National Obs., Univ. of Aix-Marseilles, since 1864–66.<sup>f</sup> National Obs., at Accoules, before 1864–66.<sup>g</sup> Transferred from Williamstown in 1861.<sup>h</sup> *Resultate des Internationalen Breitendienstes*, 1900–1905.<sup>i</sup> With the new values of the longitudes of Adelaide and Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\mu$ (including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		" ' "	" "			h m s	"
151		+40 51 46.3	-11 28.1	104	9.999388	-0 57 1.70 <sup>a</sup>	- 9.37
152		+36 8 54.4 <sup>b</sup>	-11 2.0	172 <sup>c</sup>	9.999505	+5 47 12.2	+57.04
153		+46 59 50.6	-11 34.1	488	9.999254	-0 27 49.90 <sup>d</sup>	- 4.57
154		+40 30 1.4 <sup>b</sup>	-11 26.7	21 <sup>b</sup>	9.999387	+4 57 47.45 <sup>b</sup>	+48.92
155	New Haven, Conn. . .	+41 19 22.3	-11 29.6	40	9.999308	+4 51 40.58	+47.92
156	New Haven, Conn. . .	+41 18 36.5	-11 29.6	...	9.999306	+4 51 42.16	+47.92
157	New York, N. Y. . .	+40 48 34.6	-11 27.9	25	9.999380	+4 55 50	+48.00
158	New York, N. Y. . .	+40 45 23.1	-11 27.7	...	9.999379	+4 55 53.64	+48.01
159		+43 43 16.9 <sup>e</sup>	-11 34.9	378	9.999330	-0 29 12.15 <sup>e</sup>	- 4.80
160		+46 58 22.1	-11 34.2	55	9.999226	-2 7 53.78 <sup>a</sup>	-21.01
161		+42 19 1.9 <sup>b</sup>	-11 32.4	70 <sup>b</sup>	9.999345	+4 50 33.10 <sup>b</sup>	+47.73
162		+44 27 41.6 <sup>f</sup>	-11 35.5	290 <sup>f</sup>	9.999300	+6 12 35.92 <sup>f</sup>	+41.21
163		+37 48 5 <sup>d</sup>	-11 13.2	11 <sup>d</sup>	9.999454	+8 9 6.55 <sup>d</sup>	+80.35
164		+46 28 37.5	-11 34.9	...	9.999234	-2 3 2.18 <sup>b</sup>	-20.21
165	Odesa, Russia . . .	+46 28 36.7 <sup>d</sup>	-11 34.9	55 <sup>d</sup>	9.999237	-2 3 2.04 <sup>d</sup>	-20.21
166	O-Gyalla, Hungary . .	+47 52 27.3	-11 32.4	113	9.999206	-1 12 45.49	-11.96
167	Omaha, Nebr. . .	+41 16 5.6 <sup>b</sup>	-11 29.5	344 <sup>b</sup>	9.999300	+6 23 46.96 <sup>b</sup>	+83.00
168	Orono, Me. . .	+44 54 0	-11 35.6	31	9.999277	+4 34 40.3	+45.12
169	Ottawa, Canada . . .	+45 23 39.1 <sup>d</sup>	-11 35.6	85 <sup>d</sup>	9.999267	+5 2 51.98 <sup>d</sup>	+49.75
170	Oxford, Miss. . .	+34 22 12.6	-10 47.5	...	9.999330	+5 58 7.18	+58.83
171		+51 45 35.6 <sup>d</sup>	-11 16.9	65 <sup>a</sup>	9.999104	+0 5 2.6	+ 0.83
172		+51 45 34.2	-11 16.9	64	9.999104	+0 5 0.40	+ 0.82
173		+45 24 1.0 <sup>d</sup>	-11 35.6	31 <sup>f</sup>	9.999268	-0 47 29.13 <sup>d</sup>	- 7.80
174		+38 6 44.0 <sup>k</sup>	-11 15.1	76 <sup>d</sup>	9.999451	-0 53 25.87	- 8.73
175	Paris, France . . .	+48 50 11.2 <sup>l</sup>	-11 29.8	67 <sup>m</sup>	9.999178	-0 9 20.93 <sup>n</sup>	- 1.53
176	Palma, Malia . . .	-31 57 8.9 <sup>d</sup>	+10 23.8	60	9.999597	-7 43 21.51 <sup>d</sup>	-76.12
177		+39 58 2.1 <sup>o</sup>	-11 24.6	74 <sup>o</sup>	9.999404	+5 1 6.81 <sup>o</sup>	+40.44
178		+44 51 48.6 <sup>d</sup>	-11 35.6	32 <sup>d</sup>	9.999277	-0 55 23.07 <sup>d</sup>	- 9.10
179		+52 22 56.0 <sup>p</sup>	-11 19.3	97 <sup>p</sup>	9.999091	-0 52 15.86 <sup>p</sup>	- 8.59
180	Y. . .	+41 41 18	-11 30.8	61	9.999300	+4 55 33.6 <sup>b</sup>	+48.55
181		+50 5 16.0 <sup>o</sup>	-11 25.1	197 <sup>o</sup>	9.999155	-0 57 40.28 <sup>o</sup>	- 9.47
182		+40 20 55.8	-11 26.1	75	9.999395	+4 58 39.44	+40.00
183	Princeton, N. J. . .	+40 20 57.8 <sup>d</sup>	-11 26.1	65 <sup>d</sup>	9.999374	+4 58 37.61 <sup>d</sup>	+40.00
184	Providence, R. I. . .	+41 50 21	-11 31.2	84	9.999330	+4 45 35.95	+46.92
185	Providence, R. I. . .	+41 49 46.4	-11 31.2	...	9.999352	+4 45 37.64	+46.92
186		+59 46 18.7 <sup>e</sup>	-10 6.2	75 <sup>q</sup>	9.998914	-2 1 18.57 <sup>e</sup>	-10.99
187		+46 47 59.2	-11 34.4	90	9.999231	+4 44 52.71 <sup>b</sup>	+46.80
188		- 0 14 0	+ 0 5.6	2908	0.000198	+5 14 6.66	+51.80
189		+56 57 9.3	-10 36.9	...	9.998974	-1 36 28.10 <sup>r</sup>	-15.85
190	Brazil . . .	-22 54 23.8 <sup>o</sup>	+ 8 17.7	62 <sup>o</sup>	9.999764	+2 52 41.4 <sup>o</sup>	+28.37
191	Rome, Italy . . .	+41 53 53.6 <sup>d</sup>	-11 31.3	51 <sup>f</sup>	9.999354	-0 49 55.12 <sup>d</sup>	- 8.20
192	Rome, Italy . . .	+41 53 33.6 <sup>d</sup>	-11 31.3	104 <sup>d</sup>	9.999355	-0 49 56.34 <sup>d</sup>	- 8.20
193	Rome, Italy . . .	+41 54 12.4 <sup>d</sup>	-11 31.4	100 <sup>d</sup>	9.999357	-0 49 48.02 <sup>d</sup>	- 8.18
194	Rome, Italy . . .	+41 54 16.7	-11 31.4	75 <sup>f</sup>	9.999355	-0 49 49.28 <sup>d</sup>	- 8.18
195	San Fernando, Spain . .	+36 27 42.0 <sup>s</sup>	-11 4.3	30 <sup>s</sup>	9.999488	+0 24 49.32 <sup>s</sup>	+ 4.06
196	San Fernando, Spain . .	+36 31 7	-11 4.7	...	9.999485	+0 25 10.82	+ 4.14
197	San Francisco, Cal. . .	+37 47 27.9	-11 13.2	...	9.999454	+8 9 42.86 <sup>t</sup>	+80.45
198	San Luis, Arg. Rep. . .	-33 17 45.7	+10 37.6	800	9.999616	+4 25 22	+43.60
199	Santiago, Chile . . .	-33 26 42 <sup>d</sup>	+10 39.0	520 <sup>d</sup>	9.999604	+4 42 46.0 <sup>d</sup>	+46.45
200	Santiago, Chile . . .	-33 26 25	+10 38.9	619	9.999600	+4 42 36.5	+46.42
201	Santiago, Chile . . .	-33 33 46 <sup>b</sup>	+10 40.1	580 <sup>b</sup>	9.999595	+4 42 46 <sup>b</sup>	+46.45

\* Barometer basin.

† Axis of tower.

‡ Barometer

\* Center of south dome.

† South facade of observatory.

\* Level of obs. terrace.

\* Cassini's Meridian.

\* Center of dome.

\* Center of middle dome.

\* Main floor.

\* Tower of school.

\* Center of building, ground floor.

\* West transit pier.

legns.

/ Meridian circle pier.

\* Bench mark in east wall.



No.	Authority for—		Description.
	Latitude.	Longitude.	
151	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Obs., Capo di Monte.
152	Letter from the Dean, 1913.	Letter from Director, 1893.	Obs. of Vanderbilt Univ.
153	Swiss Triangulation, 1890.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Cantonal Observatory.
154	Letter from Director, 1913.	Letter from Director, 1913.	Schanck Obs., Rutgers College.
155	Letter from Director, 1893.	See footnote (h).	Yale Univ. Obs., since 1882.
156	Letter, Director new Obs., 1893.	Letter, Director new Obs., 1893.	Yale Univ. Obs., before 1882.
157	<i>Contributions from the Obs.</i> , 1906.	<i>Contributions from the Obs.</i> , 1906.	Columbia Univ. Obs., since 1897.
158	Letter from Director, 1879.	<i>British Nautical Almanac.</i>	Columbia Univ. Obs., before 1897.
159	<i>Annales de l'Obs.</i> , Tome II, 1887.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Mt. Gros, near Nice.
160	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Naval Observatory.
161	Letter from Director, 1913.	<i>Harvard Annals</i> , 1893.	Smith College Obs.
162	Letter from Director, 1912.	<i>Publications of Obs.</i> , 1901.	<sup>a</sup> Goodsell Obs., Carleton College.
163	Letter from Director, 1912.	Letter from Director, 1912.	Chabot Observatory.
164	<i>Pulkowa Mittheilungen</i> , No. 56, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Branch of Pulkowa Obs.
165	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
166	Letter from Director, 1897.	Letter from Director, 1897.	Royal Astrophysical Obs.
167	Letter from Director, 1912.	Letter from Director, 1912.	Creighton University Obs.
168	Letter from Director, 1912.	Letter from Director, 1912.	Obs. Univ. of Maine.
169	Letter from Chief Astronomer, 1913.	Letter from Chief Astronomer, 1913.	Dominion Astronomical Obs.
170	<i>Smithsonian Report</i> , 1880.	<i>Smithsonian Report</i> , 1880.	Obs. Univ. of Mississippi.
171	<i>Radcliffe Catalogue of Stars</i> , 1900.	<i>Radcliffe Observations</i> , 1842.	Radcliffe Observatory.
172	<i>Oxford Astron. Observations</i> , 1878.	<i>Oxford Astron. Observations</i> , 1878.	University Observatory.
173	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
174	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Observatory.
175	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Observatory of Paris.
176	<i>Meridian Observations</i> , Vol. 2, 1908.	<sup>†</sup> <i>Meridian Observations</i> , Vol. 2, 1908.	Government Observatory.
177	Letter from Director, 1913.	Letter from Director, 1913.	Flower Obs., Univ. of Pa.
178	Letter from Director, 1913.	Letter from Director, 1913.	See footnote (b).
179	<i>Veröff. K. Preuss. Geod. Inst.</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Astrophysical Obs.
180	<i>Smithsonian Report</i> , 1880.	<i>Smithsonian Report</i> , 1880.	Vassar College Obs.
181	<i>Prague Observations</i> , 1907.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial and Royal Obs.
182	Letter from Director, 1913.	Letter from Director, 1913.	Halsted Obs., Princeton Univ.
183	Letter from Director, 1913.	<i>Washington Observations</i> , 1878.	Obs. of Instruction, Princeton Univ.
184	Letter from Director, 1893.	Letter from Director, 1893.	Ladd Obs., Brown Univ.
185	<i>Astron. Nach.</i> , Nr. 2254, 1879.	<i>Astron. Nach.</i> , Nr. 2254, 1879.	Mr. Seagrave's Observatory.
186	<i>Description de l'Obs.</i> , 1845.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. Central Nicolas.
187	Letter from Director, 1912.	Letter from Director, 1912.	Quebec Obs., Plains of Abraham.
188	Letter from Director, 1897.	Letter from Director, 1897.	National Observatory.
189	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Polytechnic School Obs.
190	See footnote (c).	See footnote (c).	National Observatory.
191	<i>Memorie del R. Osserv.</i> , 1904.	Letter from Director, 1913.	Royal Obs. at Roman College.
192	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Univ. Obs. at Capitol.
193	Letter from Director, 1913.	Letter from Director, 1913.	Vatican Obs., since 1906-7.
194	<i>Publ. della Specola Vaticana</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>d</sup> Vatican Obs., before 1906-7.
195	<i>Annales del Obs.</i> , 1892.	Letter from Director, 1913.	Naval Obs., since 1797.
196	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>e</sup> Naval Obs., before 1797.
197	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	Davidson Observatory.
198	Letter from Director, 1911.	Letter from Director, 1911.	Southern Obs. of Carnegie Inst.
199	Letter from Director, 1913.	Letter from Director, 1913.	<sup>f</sup> National Obs., since 1862.
200	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>g</sup> National Obs., before 1862.
201	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., Espejo.

<sup>a</sup> Old observatory, 1877-1886, 415 feet W.<sup>b</sup> Observatory of Imperial and Royal Hydrographic Office.<sup>c</sup> Green and Davis, *Telegraphic Determinations of Longitudes on the East Coast of South America*, 1880.<sup>d</sup> In the Gregorian tower.<sup>e</sup> In Cadiz.<sup>f</sup> In Quinta Normal.<sup>g</sup> On the hill Santa Lucia, in Santiago.<sup>h</sup> Based upon data from the U. S. C. and G. Survey.<sup>†</sup> With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $p$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		° ' "	" "			h m s	s
202	South Bethlehem, Pa.	+40 36 23.2 <sup>a</sup>	-11 27.2	110	9.999391	+ 5 1 31.96 <sup>a</sup>	+ 49.53
203	South Hadley, Mass.	+42 15 18.2 <sup>b</sup>	-11 32.2	76 <sup>b</sup>	9.999346	+ 4 50 20.40 <sup>b</sup>	+ 47.70
204	St. Louis, Mo.	+38 38 3.0	-11 18.1	...	9.999432	+ 6 0 49.28	+ 59.27
205	St. Petersburg, Russia	+59 56 32.0	-10 4.2	4	9.998906	- 2 1 11.4	- 19.91
206	Stockholm, Sweden	+59 20 32.7 <sup>c</sup>	-10 11.3	44 <sup>c</sup>	9.998023	- 1 12 13.97 <sup>c</sup>	- 11.87
207	Stonyhurst, England	+53 50 40	-11 3.4	117 <sup>c</sup>	9.999056	+ 0 9 52.68	+ 1.62
208		+48 35 0.3 <sup>c</sup>	-11 30.5	144 <sup>c</sup>	9.999190	- 0 31 4.52 <sup>c</sup>	- 5.11
209		+39 54 23.3	-11 24.3	...	9.999401	+ 5 1 24.89	+ 49.52
210		-33 51 41.1	+10 42.9	44	9.999552	-10 4 49.31	- 99.36
211	Syracuse, N. Y.	+43 2 13.1	-11 33.9	160	9.999332	+ 5 4 33.36	+ 50.03
212	Syracuse, N. Y.	+43 0 48.8 <sup>b</sup>	-11 33.8	137 <sup>a</sup>	9.999332	+ 5 4 34.31 <sup>b</sup>	+ 50.03
213	Tacubaya, Mexico	+19 24 17.9 <sup>c</sup>	- 7 14.8	2285 <sup>c</sup>	9.999995	+ 6 36 46.67 <sup>c</sup>	+ 65.18
214	Tashkent, Turkestan	+41 19 31.3	-11 29.6	457	9.999396	- 4 37 10.80	- 45.53
215	Taunton, Mass.	+41 54 0	-11 31.3	8	9.999351	+ 4 44 20	+ 46.71
216	Teramo, Italy	+42 39 27 <sup>d</sup>	-11 33.1	398	9.999358	- 0 54 56	- 9.02
217	Tokyo, Japan	+35 39 17.0 <sup>c</sup>	-10 58.3	25	9.999507	- 9 18 58.22 <sup>c</sup>	- 91.82
218	Toronto, Canada	+43 39 46.0 <sup>f</sup>	-11 34.8	110 <sup>g</sup>	9.999313	+ 5 17 34.70 <sup>g</sup>	+ 52.17
219	Toronto, Canada	+43 40 0.8 <sup>g</sup>	-11 34.8	116 <sup>g</sup>	9.999313	+ 5 17 35.60 <sup>g</sup>	+ 52.17
220		+43 36 44.0	-11 34.7	194	9.999320	- 0 5 51.23	- 0.96
221	Triest, Austria	+45 38 35.5 <sup>b</sup>	-11 35.5	68 <sup>f</sup>	9.999260	- 0 55 5.23 <sup>b</sup>	- 9.05
222	Triest, Austria	+45 38 45.4 <sup>f</sup>	-11 35.5	26 <sup>f</sup>	9.999257	- 0 55 3.0	- 9.04
223	Tschardjui, Turkestan	+39 8 11.0 <sup>d</sup>	-11 20.7	188 <sup>d</sup>	9.999433	- 4 14 17.2 <sup>d</sup>	- 41.77
224	Tschardjui, Turkestan	+39 8 10.7 <sup>d</sup>	-11 20.7	167	9.999431	- 4 13 57.3	- 41.73
225	Tulse Hill, England	+51 26 47	-11 18.6	48	9.999111	+ 0 0 27.7	+ 0.06
226	Turin, Italy	+45 2 16.2 <sup>k</sup>	-11 35.7	618 <sup>k</sup>	9.999313	- 0 31 3 <sup>k</sup>	- 5.10
227	Uppsala, Sweden	+59 51 29.4 <sup>b</sup>	-10 5.2	21 <sup>b</sup>	9.999309	- 1 10 30.12 <sup>b</sup>	- 11.58
228	Uppsala, Sweden	+40 6 20.2 <sup>i</sup>	-11 25.2	236 <sup>i</sup>	9.999412	+ 5 52 53.90 <sup>i</sup>	+ 57.97
229	Uppsala, Sweden	+45 4 8.3 <sup>c</sup>	-11 35.7	276 <sup>f</sup>	9.999288	- 0 30 47.15 <sup>c</sup>	- 5.06
230	Uppsala, Sweden	+33 12 36.8 <sup>c</sup>	-10 36.7	69	9.999568	+ 5 50 11.74 <sup>c</sup>	+ 57.53
231	Uppsala, Sweden	+39 8 12.1 <sup>d</sup>	-11 20.7	220 <sup>d</sup>	9.999435	+ 8 12 50.3 <sup>d</sup>	+ 80.96
232	Utrecht, Netherlands	+52 5 9.7 <sup>m</sup>	-11 15.0	12 <sup>m</sup>	9.999003	- 0 20 31.0 <sup>m</sup>	- 3.37
233	Utrecht, Netherlands	+52 5 13	-11 15.0	23	9.999095	- 0 20 28.9	- 3.36
234	Venice, Italy	+45 26 10.5 <sup>c</sup>	-11 35.6	15 <sup>c</sup>	9.999261	- 0 49 22.12 <sup>c</sup>	- 8.11
235	Vienna, Austria	+48 13 55.1 <sup>n</sup>	-11 31.5	240 <sup>f</sup>	9.999205	- 1 5 21.35 <sup>n</sup>	- 10.74
236	Vienna, Austria	+48 12 35.5	-11 31.6	186 <sup>f</sup>	9.999202	- 1 5 31.61	- 10.76
237	Vienna, Austria	+48 12 53.8	-11 31.6	214	9.999204	- 1 5 25.17	- 10.75
238	Vienna, Austria	+48 12 46.7 <sup>o</sup>	-11 31.6	285	9.999209	- 1 5 10.96	- 10.71
239	Warsaw, Russia	+52 13 4.6 <sup>c</sup>	-11 14.3	121 <sup>c</sup>	9.999097	- 1 24 7.25 <sup>c</sup>	- 13.23
240	Washington, D. C.	+38 55 14.0 <sup>o</sup>	-11 19.6	82 <sup>p</sup>	9.999431	+ 5 8 15.78 <sup>o</sup>	+ 50.64
241	Washington, D. C.	+38 53 38.7 <sup>q</sup>	-11 19.4	31 <sup>r</sup>	9.999428	+ 5 8 12.15 <sup>q</sup>	+ 50.63
242	Washington, D. C.	+38 53 17.3 <sup>s</sup>	-11 19.4	10 <sup>s</sup>	9.999427	+ 5 8 6.24 <sup>s</sup>	+ 50.61
243	Washington, D. C.	+38 56 14.8 <sup>a</sup>	-11 19.7	...	9.999425	+ 5 8 0.0 <sup>a</sup>	+ 50.60
244	Wellesley, Mass.	+42 17 34.8	-11 32.3	61	9.999344	+ 4 45 12.7	+ 46.85
245	Wellington, N. Z.	-41 17 3.8 <sup>b</sup>	+11 29.5	127 <sup>b</sup>	9.999375	-11 39 4.27 <sup>b</sup>	-114.34
246	West Point, N. Y.	+41 23 22.1	-11 29.9	170	9.999375	+ 4 55 50.55	+ 48.00
247	Wilhelmshaven, Germany	+53 31 52.1 <sup>c</sup>	-11 5.7	9 <sup>c</sup>	9.999057	- 0 32 35.06 <sup>c</sup>	- 5.35
248	Williams Bay, Wis.	+42 34 12.6 <sup>f</sup>	-11 33.0	320 <sup>f</sup>	9.999355	+ 5 54 13.24 <sup>f</sup>	+ 58.19
249	Williamstown, Mass.	+42 42 30	-11 33.2	213	9.999344	+ 4 52 50	+ 48.19
250	Winchester, Mass.	+42 27 11	-11 32.7	30	9.999338	+ 4 44 32.4	+ 46.74
251	Windsor, N. S. W.	-33 36 30.8 <sup>b</sup>	+10 40.6	16 <sup>r</sup>	9.999556	-10 3 19.9	- 99.11
252		+31 5 48.0 <sup>c</sup>	-10 14.4	100 <sup>c</sup>	9.999619	- 8 4 44.82 <sup>c</sup>	- 79.83
253		+47 22 38.3 <sup>c</sup>	-11 33.5	469 <sup>c</sup>	9.999243	- 0 34 12.28 <sup>c</sup>	- 5.63

<sup>a</sup> Center of the clock room.  
<sup>b</sup> Ground floor of main building.  
<sup>c</sup> Small dome.  
<sup>d</sup> Barometer.  
<sup>e</sup> Siderostat pier.  
<sup>f</sup> 40-inch equatorial.  
<sup>g</sup> Intersection of equatorial axes.

<sup>h</sup> Main dome.  
<sup>i</sup> Transit pier.

<sup>j</sup> Central dome.

No.	Authority for—		Description.
	Latitude.	Longitude.	
202	Letter from Director, 1913.	<i>Washington Observations</i> , 1875.	Sayre Obs., Lehigh Univ.
203	<i>Amer. Jour. of Sci.</i> , 1883.	Letter from Director, 1913.	Williston Obs., Mt. Holyoke Coll.
204	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	<sup>a</sup> Washington University Obs.
205	<i>Astron. Nach.</i> , Nr. 2582, 1884.	<i>Astron. Nach.</i> , Nr. 2582, 1884.	Imperial University Obs.
206	Letter from Director, 1914.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of Acad. of Sci.
207	Letter from Director, 1913.	<i>Monthly Notices, R. A. S.</i> , 1851.	Stonyhurst College Obs.
208	<i>Annalen der Sternw.</i> , 1896.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
209	Letter from Director, 1912.	Letter from Director, 1912.	Sproul Obs., Swarthmore College.
210	<i>Astron. Results</i> , 1879–81.	See footnote (b).	Government Observatory.
211	Letter from Director, 1891.	Letter from Director, 1891.	Syracuse Univ. Obs.
212	Letter from Director, 1914.	Letter from Director, 1914.	Roe Observatory.
213	<i>Boletin del Obs.</i> , 1914.	<i>Anuario del Obs.</i> , 1902.	National Observatory.
214	Letter from Director, 1897.	Letter from Director, 1897.	Tashkent Observatory.
215	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Mr. Metcalf's Obs., before 1911.
216	<i>Pubbl. dell'Osserv.</i> , 1900.	Letter from Director, 1913.	Collurania Observatory.
217	<i>Annales de l'Obs.</i> , 1894.	<i>Annales de l'Obs.</i> , 1894.	University Observatory.
218	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
219	Letter from Director, 1912.	Letter from Director, 1912.	Meteorological Observatory.
220	<i>Annales de l'Obs.</i> , 1912.	<i>British Nautical Almanac</i> .	University Observatory.
221	Letter from Director, 1913.	Letter from Director, 1913.	<sup>c</sup> Imperial and Royal Maritime Obs.
222	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>d</sup> Imperial and Royal Maritime Obs.
223	<i>Astron. Nach.</i> , Nr. 4588, 1912.	Letter from Director, 1913.	International Lat. Obs., since 1909.
224	See footnote (e).	See footnote (f).	International Lat. Obs., before 1909.
225	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Obs. of Sir W. Huggins, London.
226	Letter from Director, 1913.	Letter from Director, 1913.	<sup>f</sup> Royal Obs. of the Univ., since 1913.
227	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>g</sup> Royal Obs. of the Univ., before 1913.
228	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Univ. of Ala.
229	See footnote (e).	Letter from Director, 1912.	International Lat. Obs.
230	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
231	Letter from Director, 1913.	Letter from Director, 1913.	Obs., Univ. of Ill.
232	Letter from Director, 1913.	Letter from Director, 1913.	University Obs., since 1855.
233	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1855.
234	Letter from Director, 1913.	Letter from Director, 1913.	Obs. of the Nautical Institute.
235	See footnote (h).	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>i</sup> Imperial and Royal Univ. Obs.
236	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>j</sup> Imperial and Royal Univ. Obs.
237	<i>Berliner Jahrbuch</i> .	<i>Berliner Jahrbuch</i> .	Oppolzer Obs., Josephstadt.
238	<i>Publik. der Sternw.</i> , 1892.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Kuffner Obs., Ottakring.
239	<i>Astron. Nach.</i> , Nr. 4666, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
240	<i>U. S. Naval Obs. Publications</i> , 1900.	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. N. Obs., Georgetown Heights.
241	See footnote (m).	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. Naval Obs., 1842–1893.
242	Letter from Director, 1912.	Letter from Director, 1912.	Smithsonian Astrophysical Obs.
243	<i>Astronomical Journal</i> , 1897.	<i>Astronomical Journal</i> , 1897.	Catholic Univ. Obs., Brookland.
244	Letter from Director, 1912.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Whitin Obs., Wellesley College.
245	<i>New Zealand Gazette</i> , May 7, 1914.	<i>New Zealand Gazette</i> , May 7, 1914.	Hector Observatory.
246	Letter from Director, 1891.	Letter from Director, 1891.	<sup>k</sup> U. S. Military Academy.
247	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Naval Obs.
248	<i>Astrophysical Journal</i> , 1901.	<i>Astrophysical Journal</i> , 1901.	Yerkes Obs., Univ. of Chicago.
249	Letter from Director, 1893.	Letter from Director, 1893.	Field Memorial Obs., Williams Coll.
250	Letter from Director, 1913.	Letter from Director, 1913.	Mr. Metcalf's Obs., since 1911.
251	<i>Monthly Notices, R. A. S.</i> , 1884.	<sup>n</sup> <i>Monthly Notices, R. A. S.</i> , 1888.	Mr. John Tebbutt's Obs.
252	<i>Annales de l'Obs.</i> , 1907.	<i>Annales de l'Obs.</i> , 1907.	Obs. of the Jesuits near Shanghai.
253	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of Swiss Polytechnic School.

<sup>a</sup> Old observatory 0°.125 E.

<sup>b</sup> Letter from Government Astronomer at Adelaide, 1913.

<sup>c</sup> Since 1898.

<sup>d</sup> Before 1898.

<sup>e</sup> *Resultate des Internationalen Breitendienstes*, 1900–1908.

<sup>f</sup> At Pino Torinese.

<sup>g</sup> At Palazzo Madama.

<sup>h</sup> *Astron. Arbeiten des K. K. Gradmessungs-Bureau*, 1896.

<sup>i</sup> Since 1879.

<sup>j</sup> Before 1879.

<sup>k</sup> Old observatory 9' N., 1°.2 E.

<sup>l</sup> *Resultate des Internationalen Breitendienstes*, Band I, 1908.

<sup>m</sup> *Washington Observations* for 1892, Appendix I, pp. XXXI and XXXII.

<sup>n</sup> And the new value of the longitude of Sydney.



## THE COMPUTATION OF LUNAR DISTANCES.

Tables of lunar distances are no longer given in the Ephemeris, in accordance with the decision of the Navy Department that they are now of little practical use to navigators. However, in case it is desired to use this method, the angular distance between the Moon and any heavenly body may be calculated by solving the spherical triangle of which the known parts are the polar distances of the Moon and the other body and the difference of their right ascensions, or, in other words, the angle at the pole between their hour-circles. Then, the Greenwich mean time of the observation being approximately known, and the lunar distances for the star or other body calculated for the even hour before and after, the required lunar distance may be interpolated and the longitude derived by the methods given in books on navigation.

## EXAMPLE 1.

Find the lunar distance of Aldebaran, March 5, 1917, at 10 P. M., Greenwich Mean Time.

Let  $\alpha$  and  $\delta$  - Right Ascension and Declination of the star  
 "  $\alpha'$  and  $\delta'$  - " " " " " Moon  
 " D - Lunar Distance  
 Also let  $\tan M = \tan \delta' \sec (\alpha - \alpha')$   
 Then  $\cos D = \sin \delta' \cos (M - \delta) \operatorname{cosec} M$

$\alpha = 4^h 31^m 11^s.0$	$M = 33^\circ 53' 48''$
$\alpha' = 8^h 55^m 24^s.6$	$\delta = +16^\circ 20' 41''$
$\alpha - \alpha' = 19^h 35^m 46^s.4$	$M - \delta = 17^\circ 33' 7''$
$\alpha - \alpha' = 293^\circ 56' 36''$	$\sin \delta' = 9.420069$
$\delta' = + 15^\circ 15' 8''$	$\cos (M - \delta) = 9.979295$
$\tan \delta' = 9.435642$	$\operatorname{cosec} M = 0.253602$
$\sec (\alpha - \alpha') = 0.391653$	$\cos D = 9.652966$
$\tan M = 9.827295$	$D = 63^\circ 16' 22''$

## EXAMPLE 2.

Find the lunar distance of Jupiter March 26, 1917, at noon, Greenwich Mean Time. In this case the distance is smaller and the following method is more accurate.

Let  $\alpha$  and  $\delta$  - Right Ascension and Declination of the planet  
 "  $\alpha'$  and  $\delta'$  - " " " " " Moon  
 " D - Lunar Distance  
 Also let  $\tan N = \tan \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} \frac{1}{2} (\delta - \delta')$   
 Then  $\sin \frac{1}{2} D = \sin \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} N$   
 Sin N and  $\sin \frac{1}{2} (\alpha - \alpha')$  have the same algebraic sign.

$\alpha = 2^h 23^m 57^s.5$	$\tan \frac{1}{2} (\alpha - \alpha') = 8.920918 \ n$
$\alpha' = 3^h 2^m 4^s.6$	$\cos \frac{1}{2} (\delta + \delta') = 9.979520$
$\alpha - \alpha' = 23^h 21^m 52^s.9$	$\operatorname{cosec} \frac{1}{2} (\delta - \delta') = 1.142053 \ n$
$\alpha - \alpha' = 350^\circ 28' 14''$	$\tan N = 0.042491$
$\delta = + 13^\circ 19' 23''$	$N = 47^\circ 47' 54''$
$\delta' = + 21^\circ 35' 33''$	
$\delta + \delta' = + 34^\circ 54' 56''$	$\sin \frac{1}{2} (\alpha - \alpha') = 8.919414$
$\delta - \delta' = - 8^\circ 16' 10''$	$\cos \frac{1}{2} (\delta + \delta') = 9.979520$
	$\operatorname{cosec} N = 0.130308$
$\frac{1}{2} (\alpha - \alpha') = 175^\circ 14' 7''$	$\sin \frac{1}{2} D = 9.029242$
$\frac{1}{2} (\delta + \delta') = + 17^\circ 27' 28''$	$\frac{1}{2} D = 6^\circ 8' 25''$
$\frac{1}{2} (\delta - \delta') = - 4^\circ 8' 5''$	$D = 12^\circ 16' 50''$

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Reduce the observed altitude of Polaris to the true altitude.  
Reduce the recorded time of observation to the local sidereal time.  
Take out the apparent right ascension and declination of Polaris for the time of observation.  
Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour-angle of Polaris.  
With this hour-angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.  
For other altitudes than 45°, corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.  
*Example.*—1917, August 5, at 10<sup>h</sup> 40<sup>m</sup> 30<sup>s</sup> P. M. local mean solar time, in longitude 59° west of Greenwich, suppose the true altitude of Polaris to be 33° 20' 0'', required the latitude of the place.

Local astronomical mean time	h	m	s
	10	40	30
Reduction from Table III for 10 <sup>h</sup> 40 <sup>m</sup> 30 <sup>s</sup>		+ 1	45
Greenwich sidereal time of mean noon, August 5, page 10	8	53	52
Reduction from Table III, for longitude (−3 <sup>h</sup> 56 <sup>m</sup> west, or plus)		+ 0	39
<hr/>			
Sum (having regard to signs) is equal to local sidereal time	19	36	46
R. A. of Polaris (page 281) for time of observation	1	30	56
<hr/>			
Remainder is equal to hour-angle of Polaris	18	5	50
Decl. of Polaris (page 281) for time of observation, 88° 51' 43''	.	.	''
True altitude	+33	20	0
Correction from Table I		−1	4
Correction from Table Ia			−14
<hr/>			
Latitude of the place	+33	18	42

Observations of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour-angle 0<sup>h</sup> or 12<sup>h</sup>). However, at sea, if made near elongation (hour-angle 6<sup>h</sup> or 18<sup>h</sup>), the hour-angle, and hence the local time, should be known within one minute.

Decl. H. A.	88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
0 0	−68 20 0	−68 10 0	−68 0 0	−67 50 0	−67 40 0	−67 30 0	24 0
3	68 20 1	68 10 1	68 0 1	67 50 1	67 40 1	67 30 1	23 57
6	68 19 2	68 9 2	67 59 2	67 49 2	67 39 2	67 29 2	54
9	68 17 3	68 7 3	67 57 3	67 47 3	67 37 3	67 27 3	51
12	68 14 3	68 4 3	67 54 3	67 44 3	67 34 3	67 24 3	48
0 15	−68 11 4	−68 1 4	−67 51 4	−67 41 4	−67 31 4	−67 21 4	23 45
18	68 7 5	67 57 5	67 47 5	67 37 5	67 27 5	67 17 5	42
21	68 2 5	67 52 5	67 43 5	67 33 5	67 23 5	67 13 5	39
24	67 57 6	67 47 6	67 37 6	67 27 6	67 17 6	67 7 6	36
27	67 51 7	67 41 7	67 31 7	67 21 7	67 11 7	67 1 6	33
0 30	−67 44 7	−67 34 7	−67 24 7	−67 14 7	−67 4 7	−66 55 8	23 30
33	67 37 8	67 27 8	67 17 8	67 7 8	66 57 8	66 47 8	27
36	67 29 9	67 19 9	67 9 9	66 59 9	66 49 9	66 39 9	24
39	67 20 10	67 10 10	67 0 10	66 50 9	66 40 9	66 30 9	21
42	67 10 10	67 0 10	66 50 10	66 41 11	66 31 11	66 21 10	18
0 45	−67 0 11	−66 50 11	−66 40 11	−66 30 11	−66 20 11	−66 11 11	23 15
48	66 49 12	66 39 12	66 29 12	66 19 11	66 9 11	66 0 12	12
51	66 37 13	66 27 12	66 17 12	66 8 13	65 58 12	65 48 12	9
54	66 24 13	66 15 13	66 5 13	65 55 13	65 46 13	65 36 13	6
0 57	66 11 13	66 2 14	65 52 14	65 42 13	65 33 14	65 23 14	3
1 0	−65 58 15	−65 48 14	−65 38 14	−65 29 15	−65 19 14	−65 9 14	23 0
3	65 43 15	65 34 16	65 24 15	65 14 15	65 5 15	64 55 15	22 57
6	65 28 16	65 18 16	65 9 16	64 59 16	64 50 16	64 40 16	54
9	65 12 16	65 2 16	64 53 16	64 43 16	64 34 16	64 24 16	51
1 12	−64 56 16	−64 46 16	−64 36 17	−64 27 16	−64 18 16	−64 8 16	22 48

686

TABLE I.

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl.	
H. A.								H. A.	
h	m	'	''	'	''	'	''	'	''
1	12	-64	56 18	-64	46 17	-64	36 17	-64	27 17
	15	64	38 18	64	29 18	64	19 17	64	10 18
	18	64	20 18	64	11 19	64	2 19	63	52 18
	21	64	2 18	63	52 19	63	43 19	63	34 18
	24	63	42 20	63	33 19	63	24 19	63	15 19
			20		20		20		19
1	27	-63	22 20	-63	13 20	-62	55 21	-62	46 21
	30	63	2 21	62	53 21	62	34 21	62	25 21
	33	62	41 22	62	32 21	62	23 21	62	13 21
	36	62	19 23	62	10 22	62	1 22	61	52 22
	39	61	56 23	61	47 23	61	38 23	61	29 23
			23		23		23		23
1	42	-61	33 24	-61	24 24	-61	15 24	-60	57 23
	45	61	9 24	61	0 25	60	51 24	60	42 24
	48	60	45 25	60	35 25	60	27 24	60	18 24
	51	60	20 25	60	10 25	60	2 25	59	53 25
	54	59	54 26	59	45 25	59	37 25	59	28 25
			26		26		27		26
1	57	-59	28 27	-59	19 27	-59	10 27	-59	2 27
2	0	59	1 28	58	52 27	58	43 27	58	35 27
	3	58	33 28	58	24 28	58	16 27	58	7 28
	6	58	5 28	57	56 28	57	48 28	57	39 28
	9	57	36 29	57	28 28	57	19 29	57	11 28
			29		30		29		29
2	12	-57	7 30	-56	58 30	-56	50 30	-56	42 30
	15	56	37 31	56	28 30	56	20 30	56	12 31
	18	56	6 31	55	58 30	55	50 30	55	41 31
	21	55	35 31	55	27 31	55	19 31	55	10 31
	24	55	3 32	54	55 32	54	47 32	54	39 32
			32		32		32		32
2	27	-54	31 33	-54	23 33	-54	15 33	-53	59 33
	30	53	58 34	53	50 34	53	42 33	53	34 33
	33	53	24 34	53	16 34	53	9 34	53	1 34
	36	52	50 34	52	42 34	52	35 34	52	27 34
	39	52	16 35	52	8 34	52	1 34	51	53 34
			35		35		35		35
2	42	-51	41 36	-51	33 35	-51	26 36	-51	18 35
	45	51	5 36	50	58 35	50	50 36	50	43 35
	48	50	29 36	50	22 36	50	14 36	50	7 36
	51	49	52 37	49	45 37	49	38 37	49	30 37
	54	49	15 38	49	8 38	49	1 38	48	53 37
			38		38		38		37
2	57	-48	37 38	-48	30 38	-48	23 38	-48	16 38
3	0	47	59 39	47	52 39	47	45 39	47	38 38
	3	47	20 39	47	13 39	47	6 39	47	0 39
	6	46	41 39	46	34 39	46	27 39	46	21 39
	9	46	1 40	45	55 39	45	48 39	45	41 40
			40		40		40		40
3	12	-45	21 41	-45	15 41	-45	8 40	-45	1 40
	15	44	40 41	44	34 41	44	28 41	44	21 41
	18	43	59 41	43	53 41	43	47 42	43	40 41
	21	43	18 42	43	12 42	43	5 42	42	59 42
	24	42	36 43	42	30 42	42	23 42	42	17 42
			43		43		42		42
3	27	-41	53 43	-41	47 43	-41	41 42	-41	35 42
	30	41	10 43	41	4 43	40	59 43	40	53 43
	33	40	27 43	40	21 43	40	16 44	40	10 43
	36	39	44 43	39	38 43	39	32 44	39	26 44
	39	39	00 44	38	54 44	38	48 44	38	42 44
			45		45		44		44
3	42	-38	15 45	-38	9 45	-38	4 45	-37	58 44
	45	37	30 45	37	24 45	37	19 45	37	14 45
	48	36	45 46	36	39 45	36	34 46	36	29 46
	51	35	59 46	35	54 46	35	48 46	35	43 46
	54	35	13 46	35	8 46	35	3 46	34	58 45
			46		46		46		46
3	57	-34	27 47	-34	22 47	-34	17 47	-34	12 47
4	0	33	40 47	33	35 47	33	30 47	33	25 47
	3	32	53 47	32	48 47	32	43 47	32	38 47
	6	32	5 48	32	0 48	31	56 47	31	51 47
			48		47		48		47
4	9	-31	17 48	-31	13 47	-31	8 48	-31	4 47

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.	
h	m								
		'	"	'	"	'	"	'	"
4	9	-31	17 48	-31	13 48	-31	8 48	-31	4 46
	12	30	29 48	30	25 49	30	20 48	30	16 48
	15	29	41 49	29	36 49	29	28 48	29	24 48
	18	28	52 49	28	47 48	28	40 49	28	36 49
	21	28	3 49	27	59 49	27	51 49	27	47 49
4	24	-27	14 50	-27	10 50	-27	6 49	-26	58 49
	27	26	24 50	26	20 49	26	17 50	26	9 49
	30	25	34 50	25	31 50	25	27 50	25	20 49
	33	24	44 50	24	41 50	24	37 50	24	30 50
	36	23	54 51	23	51 51	23	47 50	23	44 50
4	39	-23	3 51	-23	0 51	-22	57 51	-22	54 51
	42	22	12 51	22	9 51	22	6 51	22	3 50
	45	21	21 51	21	18 51	21	15 51	21	13 51
	48	20	30 51	20	27 51	20	24 51	20	22 51
	51	19	39 52	19	36 52	19	33 51	19	31 52
4	54	-18	47 52	-18	44 51	-18	42 52	-18	39 51
4	57	17	55 52	17	53 52	17	50 52	17	48 52
5	0	17	3 52	17	1 52	16	58 51	16	56 52
	3	16	11 52	16	9 52	16	7 52	16	4 52
	6	15	19 52	15	17 53	15	15 53	15	12 52
5	9	-14	27 53	-14	24 52	-14	22 52	-14	20 52
	12	13	34 53	13	32 53	13	30 53	13	28 52
	15	12	41 53	12	39 53	12	37 52	12	36 53
	18	11	48 53	11	46 53	11	45 52	11	43 53
	21	10	55 53	10	53 53	10	52 53	10	50 52
5	24	-10	2 53	-10	0 53	-	9 59 53	-	9 58 53
	27	9	9 53	9	7 53	9	6 53	9	5 53
	30	8	16 54	8	14 53	8	13 53	8	12 53
	33	7	22 54	7	21 53	7	20 53	7	19 53
	36	6	28 53	6	28 54	6	27 54	6	26 53
5	39	-5	35 54	-	5 34 53	-	5 33 53	-	5 33 53
	42	4	41 53	4	41 53	4	40 53	4	40 54
	45	3	48 54	3	48 54	3	47 54	3	46 54
	48	2	54 54	2	54 54	2	53 53	2	53 53
	51	2	0 53	2	0 54	2	0 54	2	0 54
5	54	-	1 7 54	-	1 6 53	-	1 6 53	-	1 6 53
5	57	-	0 13 54	-	0 13 54	-	0 13 53	-	0 13 53
6	0	+	0 41 53	+	0 41 53	+	0 40 54	+	0 40 53
	3	1	34 54	1	34 54	1	34 53	1	33 54
	6	2	28 54	2	28 53	2	27 53	2	27 53
6	9	+	3 22 53	+	3 21 54	+	3 20 54	+	3 20 53
	12	4	15 54	4	15 53	4	14 53	4	13 53
	15	5	9 53	5	8 53	5	7 53	5	6 53
	18	6	2 54	6	1 53	6	0 53	5	59 53
	21	6	56 53	6	54 54	6	53 53	6	52 53
6	24	+	7 49 53	+	7 48 53	+	7 46 53	+	7 45 53
	27	8	42 53	8	41 53	8	39 53	8	38 53
	30	9	35 53	9	34 53	9	32 53	9	31 52
	33	10	28 53	10	27 52	10	25 53	10	23 53
	36	11	21 53	11	19 53	11	18 52	11	16 52
6	39	+12	14 53	+12	12 53	+12	10 53	+12	8 53
	42	13	7 52	13	5 52	13	3 52	13	1 52
	45	13	59 53	13	57 52	13	55 52	13	53 52
	48	14	52 52	14	49 52	14	47 52	14	45 52
	51	15	44 52	15	41 52	15	39 52	15	37 51
6	54	+16	36 52	+16	33 52	+16	31 51	+16	28 52
6	57	17	28 51	17	25 51	17	22 52	17	20 51
7	0	18	19 52	18	16 52	18	14 51	18	11 51
	3	19	11 51	19	8 51	19	5 51	19	2 51
7	6	+20	2 51	+19	59 51	+19	56 51	+19	53 51

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.							
h	m	'	''	'	''	'	''	'	''	h	m				
7	6	+20	2 51	+19	59 51	+19	53 51	+19	50 51	+19	47 50	16	54		
	9	20	53 51	20	50 51	20	44 50	20	41 50	20	37 51		51		
	12	21	44 51	21	41 50	21	34 50	21	31 50	21	28 50		48		
	15	22	35 50	22	31 50	22	24 50	22	21 50	22	18 49		45		
	18	23	25 50	23	21 50	23	14 50	23	11 50	23	7 50		42		
7	21	+24	15 50	+24	11 50	+24	8 49	+24	4 49	+24	1 49	+23	57 49	16	39
	24	25	5 50	25	1 50	24	57 49	24	54 49	24	50 49	24	46 49		36
	27	25	55 49	25	51 49	25	47 49	25	43 49	25	39 49	25	35 49		33
	30	26	44 49	26	40 50	26	36 40	26	32 49	26	28 49	26	24 48		30
	33	27	33 49	27	30 48	27	25 48	27	21 48	27	17 48	27	12 49		27
7	36	+28	22 48	+28	18 48	+28	13 49	+28	9 48	+28	5 48	+28	1 48	16	24
	39	29	10 48	29	6 48	29	2 48	28	57 48	28	53 48	28	49 47		21
	42	29	58 48	29	54 48	29	50 47	29	45 48	29	41 47	29	36 47		18
	45	30	46 48	30	42 47	30	37 47	30	33 48	30	28 47	30	23 47		15
	48	31	34 47	31	29 47	31	24 47	31	20 47	31	15 47	31	10 47		12
7	51	+32	21 47	+32	16 47	+32	11 47	+32	7 46	+32	2 46	+31	57 46	16	9
	54	33	8 47	33	3 47	32	58 46	32	53 46	32	48 46	32	43 46		6
7	57	33	55 46	33	50 46	33	44 46	33	39 46	33	34 46	33	29 46		3
8	0	34	41 46	34	36 45	34	30 46	34	25 46	34	20 46	34	15 45	16	0
	3	35	27 45	35	21 46	35	16 45	35	11 45	35	6 45	35	0 45	15	57
8	6	+36	12 45	+36	7 45	+36	1 45	+35	56 45	+35	51 44	+35	45 45	15	54
	9	36	57 45	36	52 44	36	46 45	36	41 44	36	35 44	36	30 44		51
	12	37	42 44	37	36 44	37	31 44	37	25 44	37	19 44	37	14 44		48
	15	38	26 44	38	20 44	38	15 44	38	9 44	38	3 44	37	58 43		45
	18	39	10 44	39	4 44	38	58 44	38	53 43	38	47 43	38	41 43		42
8	21	+39	54 43	+39	48 43	+39	42 43	+39	36 43	+39	30 43	+39	24 43	15	39
	24	40	37 43	40	31 42	40	25 42	40	19 42	40	13 42	40	7 42		36
	27	41	20 42	41	13 42	41	7 42	41	1 42	40	55 42	40	49 42		33
	30	42	2 42	41	55 42	41	49 42	41	43 42	41	37 41	41	31 41		30
	33	42	44 41	42	37 42	42	31 41	42	25 41	42	18 41	42	12 41		27
8	36	+43	25 41	+43	19 41	+43	12 41	+43	6 41	+42	59 41	+42	53 40	15	24
	39	44	6 40	44	0 40	43	53 40	43	47 40	43	40 40	43	33 40		21
	42	44	46 40	44	40 40	44	33 40	44	27 40	44	20 40	44	13 40		18
	45	45	26 40	45	20 39	45	13 39	45	7 39	45	0 39	44	53 39		15
	48	46	6 39	45	59 39	45	52 39	45	46 39	45	39 39	45	32 39		12
8	51	+46	45 39	+46	38 39	+46	31 39	+46	25 38	+46	18 38	+46	11 38	15	9
	54	47	24 38	47	17 38	47	10 38	47	3 38	46	56 38	46	49 38		6
8	57	48	2 38	47	55 38	47	48 38	47	41 38	47	34 38	47	27 38		3
9	0	48	40 37	48	33 38	48	25 37	48	18 37	48	11 37	48	4 37	15	0
	3	49	17 37	49	10 36	49	2 37	48	55 36	48	48 36	48	41 36	14	57
9	6	+49	54 36	+49	46 36	+49	39 36	+49	31 36	+49	24 36	+49	17 36	14	54
	9	50	30 35	50	22 36	50	15 35	50	7 36	50	0 35	49	53 35		51
	12	51	5 35	50	58 35	50	50 35	50	43 35	50	35 35	50	28 34		48
	15	51	40 35	51	33 34	51	25 35	51	18 34	51	10 34	51	2 35		45
	18	52	15 34	52	7 34	52	0 34	51	52 34	51	44 34	51	37 33		42
9	21	+52	49 34	+52	41 34	+52	34 33	+52	26 33	+52	18 33	+52	10 33	14	39
	24	53	23 33	53	15 33	53	7 33	52	59 33	52	51 33	52	43 33		36
	27	53	56 32	53	48 32	53	40 32	53	32 32	53	24 32	53	16 32		33
	30	54	28 32	54	20 32	54	12 32	54	4 32	53	56 32	53	48 31		30
	33	55	0 31	54	52 31	54	44 31	54	36 31	54	28 31	54	19 31		27
9	36	+55	31 31	+55	23 31	+55	15 30	+55	7 30	+54	59 30	+54	50 31	14	24
	39	56	2 30	55	54 30	55	45 30	55	37 30	55	29 30	55	21 30		21
	42	56	32 30	56	24 29	56	15 30	56	7 30	55	59 29	55	51 29		18
	45	57	2 29	56	53 29	56	45 29	56	37 29	56	28 29	56	20 29		15
	48	57	31 28	57	22 29	57	14 28	57	6 28	56	57 28	56	49 28		12
9	51	+57	59 28	+57	51 28	+57	42 28	+57	34 27	+57	25 28	+57	17 27	14	9
	54	58	27 27	58	19 27	58	10 27	58	1 27	57	53 27	57	44 27		6
9	57	58	54 27	58	46 26	58	37 27	58	28 27	58	20 26	58	11 26		3
10	0	59	21 26	59	12 26	59	4 26	58	55 26	58	46 26	58	37 26	14	0
10	3	+59	47 26	+59	38 26	+59	30 26	+59	21 26	+59	12 26	+59	3 26	13	57

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.	
h	m	' "	' "	' "	' "	' "	' "	h	m
10	3	+59 47 26	+59 38 26	+59 30 25	+59 21 25	+59 12 25	+59 3 25	13	57
	6	60 13 24	60 4 24	59 55 25	59 46 25	59 37 25	59 28 25		54
	9	60 37 25	60 28 25	60 20 24	60 11 25	60 2 25	59 53 25		51
	12	61 2 23	60 53 23	60 44 24	60 35 24	60 26 24	60 17 24		48
	15	61 25 23	61 16 23	61 7 23	60 58 23	60 49 23	60 40 23		45
10	18	+61 48 23	+61 39 23	+61 30 22	+61 21 22	+61 12 22	+61 3 22	13	42
	21	62 11 21	62 2 21	61 52 22	61 43 22	61 34 22	61 25 21		39
	24	62 32 21	62 23 21	62 14 21	62 5 21	61 56 21	61 46 21		36
	27	62 53 21	62 44 21	62 35 21	62 26 21	62 17 21	62 7 21		33
	30	63 14 20	63 5 19	62 55 20	63 46 20	62 37 20	62 28 19		30
10	33	+63 34 19	+63 24 20	+63 15 19	+63 6 19	+62 57 19	+62 47 19	13	27
	36	63 53 19	63 44 18	63 34 19	63 25 18	63 16 18	63 6 18		24
	39	64 12 17	64 2 18	63 53 18	63 43 18	63 34 18	63 24 18		21
	42	64 29 18	64 20 17	64 11 17	64 1 17	63 52 17	63 42 17		18
	45	64 47 16	64 37 17	64 28 16	64 18 17	64 9 16	63 59 17		15
10	48	+65 3 16	+64 54 16	+64 44 16	+64 35 16	+64 25 16	+64 16 15	13	12
	51	65 19 15	65 10 15	65 0 15	64 51 15	64 41 15	64 31 15		9
	54	65 34 15	65 25 15	65 15 15	65 6 15	64 56 15	64 46 15		6
10	57	65 49 14	65 40 14	65 30 14	65 20 14	65 11 15	65 1 15		3
11	0	66 3 13	65 54 13	65 44 13	65 34 13	65 24 14	65 15 13	13	0
11	3	+66 16 13	+66 7 12	+65 57 12	+65 47 13	+65 38 12	+65 28 12	12	57
	6	66 29 12	66 19 12	66 9 12	66 0 12	65 50 12	65 40 12		54
	9	66 41 11	66 31 11	66 21 12	66 12 11	66 2 11	65 52 11		51
	12	66 52 11	66 42 11	66 33 12	66 23 11	66 13 11	66 3 11		48
	15	67 3 10	66 53 10	66 43 10	66 33 10	66 24 11	66 14 10		45
11	18	+67 13 9	+67 3 9	+66 53 9	+66 43 9	+66 33 9	+66 24 9	12	42
	21	67 22 8	67 12 8	67 2 9	66 52 9	66 42 9	66 33 9		39
	24	67 30 8	67 20 8	67 11 9	67 1 9	66 51 9	66 41 8		36
	27	67 38 8	67 28 8	67 19 8	67 9 8	66 59 8	66 49 8		33
	30	67 46 6	67 36 6	67 26 6	67 16 6	67 6 6	66 56 6		30
11	33	+67 52 6	+67 42 6	+67 32 6	+67 22 6	+67 12 6	+67 2 6	12	27
	36	67 58 5	67 48 5	67 38 5	67 28 5	67 18 5	67 8 5		24
	39	68 3 5	67 53 5	67 43 5	67 33 5	67 23 5	67 13 5		21
	42	68 8 3	67 58 3	67 48 3	67 38 3	67 28 3	67 18 3		18
	45	68 11 3	68 1 3	67 51 3	67 41 3	67 31 3	67 21 3		15
11	48	+68 14 3	+68 4 3	+67 54 3	+67 44 3	+67 34 3	+67 24 3	12	12
	51	68 17 2	68 7 2	67 57 2	67 47 2	67 37 2	67 27 2		9
	54	68 19 1	68 9 1	67 59 1	67 49 1	67 39 1	67 29 1		6
11	57	68 20 0	68 10 0	68 0 0	67 50 0	67 40 0	67 30 0		3
12	0	+68 20 0	+68 10 0	+68 0 0	+67 50 0	+67 40 0	+67 30 0	12	0

TABLE Ia.

Table I has been computed for an altitude of 45°. For other altitudes, corrections taken from the following table may be applied when the desired degree of accuracy requires it.

Altitude. H. A.		10°	20°	30°	40°	50°	60°	70°	Altitude. H. A.	
h	h	"	"	"	"	"	"	"	h	h
0	12	0	0	0	0	0	0	0	12	24
1	11	- 2	- 2	- 1	0	0	+ 2	+ 5	13	23
2	10	8	7	4	-2	+2	8	18	14	22
3	9	17	13	9	3	4	15	36	15	21
4	8	25	20	13	5	6	23	53	16	20
5	7	32	24	16	6	7	28	66	17	19
6	6	-34	-26	-17	-7	+8	+30	+71	18	18

## TABLE II.

SIDEREAL INTO MEAN SOLAR TIME.

TO BE

FROM A SIDEREAL TIME INTERVAL.



SIDEREAL INTO MEAN SOLAR TIME.  
TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.



## TABLE II.

INTO MEAN SOLAR TIME.

TO BE

FROM A SIDEREAL TIME INTERVAL.

## MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME

Mean Solar.	0 <sup>h</sup>	1 <sup>h</sup>
m	m s	m s
0	0 0.000	0 9.856
1	0 0.164	0 10.021
2	0 0.329	0 10.185
3	0 0.493	0 10.349
4	0 0.657	0 10.514
5	0 0.821	0 10.678
6	0 0.986	0 10.842
7	0 1.150	0 11.006
8	0 1.314	0 11.171
9	0 1.478	0 11.335
10	0 1.643	0 11.499
11	0 1.807	0 11.663
12	0 1.971	0 11.828
13	0 2.136	0 11.992
14	0 2.300	0 12.156
15	0 2.464	0 12.321
16	0 2.628	0 12.485
17	0 2.793	0 12.649
18	0 2.957	0 12.813
19	0 3.121	0 12.978
20	0 3.285	0 13.142
21	0 3.450	0 13.306
22	0 3.614	0 13.471
23	0 3.778	0 13.635
24	0 3.943	0 13.799
25	0 4.107	0 13.963
26	0 4.271	0 14.128
27	0 4.435	0 14.292
28	0 4.600	0 14.456
29	0 4.764	0 14.620
30	0 4.928	0 14.785
31	0 5.093	0 14.949
32	0 5.257	0 15.113
33	0 5.421	0 15.278
34	0 5.585	0 15.442
35	0 5.750	0 15.606
36	0 5.914	0 15.770
37	0 6.078	0 15.935
38	0 6.242	0 16.099
39	0 6.407	0 16.263
40	0 6.571	0 16.427
41	0 6.735	0 16.592
42	0 6.900	0 16.756
43	0 7.064	0 16.920
44	0 7.228	0 17.085
45	0 7.392	0 17.249
46	0 7.557	0 17.413
47	0 7.721	0 17.577
48	0 7.885	0 17.742
49	0 8.049	0 17.906
50	0 8.214	0 18.070
51	0 8.378	0 18.234
52	0 8.542	0 18.399
53	0 8.707	0 18.563
54	0 8.871	0 18.727
55	0 9.035	0 18.892
56	0 9.199	0 19.056
57	0 9.364	0 19.220
58	0 9.528	0 19.384
59	0 9.692	0 19.549

MEAN SOLAR INTO SIDEREAL TIME.  
TO BE ADDED TO A MEAN TIME

MEAN SOLAR INTO SIDEREAL TIME.  
TO BE ADDED TO A MEAN TIME INTERVAL.

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

**[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]**

Lat. H. A.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. H. A.		
h	m	°	'	°	'	°	'	°	'	°	'	h	m
0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	24	0
	10	0	3.0	0	3.1	0	3.2	0	3.3	0	3.4	23	50
	20	0	6.0	0	6.2	0	6.3	0	6.5	0	6.6		40
0	30	0	9.0	0	9.2	0	9.5	0	9.6	0	9.8	23	30
	40	0	12.0	0	12.3	0	12.6	0	12.8	0	13.0		20
	50	0	15.0	0	15.3	0	15.7	0	16.0	0	16.2		10
1	0	0	17.9	0	18.3	0	18.8	0	19.1	0	19.4	23	0
	10	0	20.8	0	21.3	0	21.9	0	22.2	0	22.5	22	50
	20	0	23.7	0	24.2	0	24.9	0	25.2	0	25.6		40
1	30	0	26.5	0	27.0	0	27.8	0	28.2	0	28.7	22	30
	40	0	29.2	0	29.9	0	30.7	0	31.2	0	31.7		20
	50	0	31.9	0	32.6	0	33.6	0	34.1	0	34.6		10
2	0	0	34.6	0	35.3	0	36.4	0	36.9	0	37.5	22	0
	10	0	37.2	0	37.9	0	39.1	0	39.6	0	40.2	21	50
	20	0	39.7	0	40.5	0	41.7	0	42.3	0	42.9		40
2	30	0	42.1	0	43.0	0	44.2	0	44.9	0	45.6	21	30
	40	0	44.5	0	45.4	0	46.7	0	47.4	0	48.1		20
	50	0	46.7	0	47.7	0	49.1	0	49.8	0	50.6		10
3	0	0	48.9	0	49.9	0	51.4	0	52.1	0	52.9	21	0
	10	0	51.0	0	52.0	0	53.6	0	54.3	0	55.2	20	50
	20	0	52.9	0	54.0	0	55.6	0	56.4	0	57.3		40
3	30	0	54.8	0	56.0	0	57.6	0	58.4	0	59.3	20	30
	40	0	56.6	0	57.8	0	59.5	1	0.3	1	1.2		20
	50	0	58.3	0	59.5	1	1.2	1	2.1	1	3.0		10
4	0	0	59.8	1	1.1	1	2.8	1	3.7	1	4.7	20	0
	10	1	1.3	1	2.5	1	4.3	1	5.2	1	6.2	19	50
	20	1	2.6	1	3.9	1	5.7	1	6.6	1	7.6		40
4	30	1	3.8	1	5.1	1	7.0	1	7.9	1	8.9	19	30
	40	1	4.9	1	6.2	1	8.1	1	9.0	1	10.1		20
	50	1	5.8	1	7.2	1	9.1	1	10.0	1	11.1		10
5	0	1	6.7	1	8.0	1	9.9	1	10.9	1	12.0	19	0
	10	1	7.4	1	8.7	1	10.7	1	11.6	1	12.7	18	50
	20	1	8.0	1	9.3	1	11.3	1	12.2	1	13.3		40
5	30	1	8.4	1	9.8	1	11.7	1	12.7	1	13.8	18	30
	40	1	8.7	1	10.1	1	12.0	1	13.0	1	14.1		20
	50	1	8.9	1	10.3	1	12.2	1	13.2	1	14.3		10
6	0	1	9.0	1	10.3	1	12.3	1	13.2	1	14.3	18	0
	10	1	8.9	1	10.2	1	12.2	1	13.2	1	14.2	17	50
	20	1	8.7	1	10.0	1	12.0	1	12.9	1	14.0		40
6	30	1	8.3	1	9.7	1	11.6	1	12.5	1	13.6	17	30
	40	1	7.9	1	9.2	1	11.1	1	12.0	1	13.1		20
	50	1	7.3	1	8.6	1	10.5	1	11.4	1	12.4		10
7	0	1	6.6	1	7.8	1	9.7	1	10.6	1	11.6	17	0
	10	1	5.7	1	6.9	1	8.8	1	9.7	1	10.7	16	50
	20	1	4.7	1	5.9	1	7.8	1	8.6	1	9.6		40
7	30	1	3.6	1	4.8	1	6.6	1	7.5	1	8.4	16	30
	40	1	2.4	1	3.6	1	5.3	1	6.2	1	7.1		20
	50	1	1.1	1	2.2	1	3.9	1	4.7	1	5.7		10
8	0	0	59.6	1	0.7	1	2.4	1	3.2	1	4.1	16	0
	10	0	58.1	0	59.1	1	0.7	1	1.5	1	2.4	15	50
	20	0	56.4	0	57.4	0	59.0	0	59.7	1	0.6		40
8	30	0	54.6	0	55.6	0	57.1	0	57.8	0	58.7	15	30
	40	0	52.7	0	53.7	0	55.1	0	55.8	0	56.6		20
	50	0	50.7	0	51.6	0	53.0	0	53.7	0	54.5		10
9	0	0	48.6	0	49.5	0	50.8	0	51.5	0	52.2	15	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. H. A.	
h m		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	
		0 48.6	0 49.5	0 50.8	0 51.5	0 52.2	0 53.1	0 54.0	0 55.0	0 56.1		
9	0	0 48.6	0 49.5	0 50.8	0 51.5	0 52.2	0 53.1	0 54.0	0 55.0	0 56.1	15	0
	10	0 46.5	0 47.3	0 48.6	0 49.2	0 49.9	0 50.7	0 51.6	0 52.5	0 53.6	14	50
	20	0 44.2	0 45.0	0 46.2	0 46.8	0 47.5	0 48.2	0 49.0	0 50.0	0 51.0		40
9	30	0 41.9	0 42.6	0 43.7	0 44.3	0 44.9	0 45.6	0 46.4	0 47.3	0 48.3	14	30
	40	0 39.5	0 40.2	0 41.2	0 41.7	0 42.3	0 43.0	0 43.7	0 44.6	0 45.5		20
	50	0 37.0	0 37.6	0 38.6	0 39.1	0 39.6	0 40.3	0 41.0	0 41.7	0 42.6		10
10	0	0 34.4	0 35.0	0 35.9	0 36.4	0 36.9	0 37.5	0 38.1	0 38.8	0 39.6	14	0
	10	0 31.8	0 32.3	0 33.1	0 33.6	0 34.1	0 34.6	0 35.2	0 35.8	0 36.6	13	50
	20	0 29.1	0 29.6	0 30.3	0 30.7	0 31.2	0 31.7	0 32.2	0 32.8	0 33.5		40
10	30	0 26.3	0 26.8	0 27.5	0 27.8	0 28.2	0 28.7	0 29.2	0 29.7	0 30.3	13	30
	40	0 23.5	0 23.9	0 24.6	0 24.9	0 25.2	0 25.6	0 26.0	0 26.5	0 27.1		20
	50	0 20.7	0 21.0	0 21.6	0 21.9	0 22.2	0 22.5	0 22.9	0 23.3	0 23.8		10
11	0	0 17.8	0 18.1	0 18.6	0 18.8	0 19.1	0 19.4	0 19.7	0 20.1	0 20.5	13	0
	10	0 14.9	0 15.1	0 15.5	0 15.7	0 16.0	0 16.2	0 16.5	0 16.8	0 17.1	12	50
	20	0 11.9	0 12.1	0 12.5	0 12.6	0 12.8	0 13.0	0 13.2	0 13.5	0 13.7		40
11	30	0 9.0	0 9.1	0 9.4	0 9.5	0 9.6	0 9.8	0 9.9	0 10.1	0 10.3	12	30
	40	0 6.0	0 6.1	0 6.2	0 6.3	0 6.4	0 6.5	0 6.6	0 6.8	0 6.9		20
	50	0 3.0	0 3.0	0 3.1	0 3.2	0 3.2	0 3.3	0 3.3	0 3.4	0 3.5		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat. H. A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H. A.	
h m		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	
		0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0		
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.1	0 4.2	0 4.4	0 4.5	23	50
	20	0 7.1	0 7.2	0 7.4	0 7.6	0 7.8	0 8.1	0 8.4	0 8.7	0 9.0		40
0	30	0 10.6	0 10.8	0 11.1	0 11.4	0 11.8	0 12.1	0 12.6	0 13.0	0 13.5	23	30
	40	0 14.1	0 14.4	0 14.8	0 15.2	0 15.7	0 16.1	0 16.7	0 17.3	0 18.0		20
	50	0 17.5	0 18.0	0 18.4	0 18.9	0 19.5	0 20.1	0 20.8	0 21.6	0 22.4		10
1	0	0 21.0	0 21.5	0 22.0	0 22.6	0 23.3	0 24.1	0 24.9	0 25.8	0 26.8	23	0
	10	0 24.4	0 24.9	0 25.6	0 26.3	0 27.1	0 28.0	0 28.9	0 30.0	0 31.2	22	50
	20	0 27.7	0 28.4	0 29.1	0 29.9	0 30.8	0 31.8	0 32.9	0 34.1	0 35.4		40
1	30	0 31.0	0 31.7	0 32.5	0 33.4	0 34.4	0 35.6	0 36.8	0 38.1	0 39.6	22	30
	40	0 34.2	0 35.0	0 35.9	0 36.9	0 38.0	0 39.3	0 40.6	0 42.1	0 43.8		20
	50	0 37.4	0 38.3	0 39.3	0 40.3	0 41.5	0 42.9	0 44.3	0 46.0	0 47.8		10
2	0	0 40.5	0 41.4	0 42.5	0 43.7	0 45.0	0 46.4	0 48.0	0 49.8	0 51.7	22	0
	10	0 43.5	0 44.5	0 45.6	0 46.9	0 48.3	0 49.8	0 51.5	0 53.4	0 55.5	21	50
	20	0 46.4	0 47.5	0 48.7	0 50.1	0 51.6	0 53.2	0 55.0	0 57.0	0 59.3		40
2	30	0 49.2	0 50.4	0 51.7	0 53.1	0 54.7	0 56.4	0 58.3	1 0.5	1 2.9	21	30
	40	0 52.0	0 53.2	0 54.6	0 56.0	0 57.7	0 59.6	1 1.6	1 3.8	1 6.3		20
	50	0 54.6	0 55.9	0 57.3	0 58.9	1 0.6	1 2.6	1 4.7	1 7.0	1 9.7		10
3	0	0 57.1	0 58.5	1 0.0	1 1.6	1 3.4	1 5.4	1 7.7	1 10.1	1 12.9	21	0
	10	0 59.5	1 0.9	1 2.5	1 4.2	1 6.1	1 8.2	1 10.5	1 13.1	1 15.9	20	50
	20	1 1.8	1 3.3	1 4.9	1 6.7	1 8.6	1 10.8	1 13.2	1 15.9	1 18.8		40
3	30	1 4.0	1 5.5	1 7.2	1 9.0	1 11.0	1 13.3	1 15.8	1 18.5	1 21.6	20	30
	40	1 6.1	1 7.6	1 9.3	1 11.2	1 13.3	1 15.6	1 18.2	1 21.0	1 24.2		20
	50	1 8.0	1 9.6	1 11.4	1 13.3	1 15.4	1 17.8	1 20.4	1 23.4	1 26.6		10
4	0	1 9.8	1 11.4	1 13.2	1 15.2	1 17.4	1 19.8	1 22.5	1 25.5	1 28.9	20	0
	10	1 11.4	1 13.1	1 15.0	1 17.0	1 19.2	1 21.7	1 24.5	1 27.5	1 31.0	19	50
	20	1 13.0	1 14.7	1 16.6	1 18.6	1 20.9	1 23.4	1 26.3	1 29.4	1 32.9		40
4	30	1 14.3	1 16.1	1 18.0	1 20.1	1 22.4	1 25.0	1 27.9	1 31.0	1 34.6	19	30
	40	1 15.6	1 17.3	1 19.3	1 21.4	1 23.8	1 26.4	1 29.3	1 32.5	1 36.1		20
	50	1 16.7	1 18.4	1 20.4	1 22.6	1 25.0	1 27.6	1 30.6	1 33.8	1 37.4		10
5	0	1 17.6	1 19.4	1 21.4	1 23.6	1 26.0	1 28.7	1 31.7	1 34.9	1 38.6	19	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H. A.										
h	m	°	′	°	′	°	′	°	′	°	′	h	m								
5	0	1	17.6	1	19.4	1	21.4	1	23.6	1	26.0	1	28.7	1	31.7	1	34.9	1	38.6	19	0
	10	1	18.4	1	20.2	1	22.2	1	24.4	1	26.9	1	29.6	1	32.6	1	35.9	1	39.6	18	50
	20	1	19.0	1	20.9	1	22.9	1	25.1	1	27.6	1	30.3	1	33.3	1	36.6	1	40.3		40
5	30	1	19.5	1	21.4	1	23.4	1	25.6	1	28.1	1	30.8	1	33.8	1	37.2	1	40.9	18	30
	40	1	19.9	1	21.7	1	23.7	1	26.0	1	28.5	1	31.2	1	34.2	1	37.6	1	41.3		20
	50	1	20.1	1	21.9	1	23.9	1	26.2	1	28.6	1	31.4	1	34.4	1	37.8	1	41.5		10
6	0	1	20.1	1	21.9	1	24.0	1	26.2	1	28.7	1	31.4	1	34.4	1	37.8	1	41.5	18	0
	10	1	20.0	1	21.8	1	23.8	1	26.0	1	28.5	1	31.2	1	34.2	1	37.6	1	41.3	17	50
	20	1	19.7	1	21.5	1	23.5	1	25.7	1	28.2	1	30.9	1	33.9	1	37.2	1	40.9		40
6	30	1	19.3	1	21.1	1	23.1	1	25.3	1	27.7	1	30.4	1	33.4	1	36.7	1	40.3	17	30
	40	1	18.7	1	20.5	1	22.5	1	24.7	1	27.1	1	29.7	1	32.7	1	35.9	1	39.6		20
	50	1	18.0	1	19.8	1	21.7	1	23.9	1	26.2	1	28.9	1	31.8	1	35.0	1	38.6		10
7	0	1	17.1	1	18.9	1	20.8	1	22.9	1	25.3	1	27.9	1	30.7	1	33.9	1	37.5	17	0
	10	1	16.1	1	17.8	1	19.7	1	21.8	1	24.1	1	26.7	1	29.5	1	32.7	1	36.2	16	50
	20	1	14.9	1	16.6	1	18.5	1	20.6	1	22.8	1	25.4	1	28.1	1	31.2	1	34.7		40
7	30	1	13.6	1	15.3	1	17.1	1	19.1	1	21.4	1	23.9	1	26.6	1	29.6	1	33.0	16	30
	40	1	12.2	1	13.8	1	15.6	1	17.6	1	19.8	1	22.2	1	24.9	1	27.8	1	31.1		20
	50	1	10.6	1	12.2	1	14.0	1	15.9	1	18.0	1	20.4	1	23.0	1	25.9	1	29.1		10
8	0	1	8.9	1	10.5	1	12.2	1	14.1	1	16.1	1	18.4	1	21.0	1	23.8	1	26.9	16	0
	10	1	7.1	1	8.6	1	10.3	1	12.1	1	14.1	1	16.3	1	18.8	1	21.6	1	24.6	15	50
	20	1	5.1	1	6.6	1	8.2	1	10.0	1	11.9	1	14.1	1	16.5	1	19.2	1	22.1		40
8	30	1	3.1	1	4.5	1	6.0	1	7.7	1	9.6	1	11.7	1	14.0	1	16.6	1	19.4	15	30
	40	1	0.9	1	2.2	1	3.7	1	5.4	1	7.2	1	9.2	1	11.4	1	13.9	1	16.7		20
	50	0	58.6	0	59.9	1	1.3	1	2.9	1	4.6	1	6.6	1	8.7	1	11.1	1	13.7		10
9	0	0	56.1	0	57.4	0	58.8	1	0.3	1	2.0	1	3.8	1	5.9	1	8.1	1	10.7	15	0
	10	0	53.6	0	54.8	0	56.1	0	57.6	0	59.2	1	0.9	1	2.9	1	5.1	1	7.5	14	50
	20	0	51.0	0	52.1	0	53.4	0	54.7	0	56.3	0	57.9	0	59.8	1	1.8	1	4.1		40
9	30	0	48.3	0	49.3	0	50.5	0	51.8	0	53.3	0	54.8	0	56.6	0	58.5	1	0.7	14	30
	40	0	45.5	0	46.5	0	47.6	0	48.8	0	50.2	0	51.7	0	53.3	0	55.1	0	57.2		20
	50	0	42.6	0	43.5	0	44.6	0	45.7	0	47.0	0	48.4	0	49.9	0	51.6	0	53.5		10
10	0	0	39.6	0	40.5	0	41.5	0	42.5	0	43.7	0	45.0	0	46.4	0	48.0	0	49.8	14	0
	10	0	36.6	0	37.4	0	38.3	0	39.2	0	40.3	0	41.5	0	42.9	0	44.3	0	46.0	13	50
	20	0	33.5	0	34.2	0	35.0	0	35.9	0	36.9	0	38.0	0	39.2	0	40.6	0	42.1		40
10	30	0	30.3	0	31.0	0	31.7	0	32.5	0	33.4	0	34.4	0	35.5	0	36.7	0	38.1	13	30
	40	0	27.1	0	27.7	0	28.3	0	29.0	0	29.9	0	30.7	0	31.7	0	32.8	0	34.0		20
	50	0	23.8	0	24.3	0	24.9	0	25.5	0	26.3	0	27.0	0	27.9	0	28.8	0	29.9		10
11	0	0	20.5	0	20.9	0	21.4	0	22.0	0	22.6	0	23.3	0	24.0	0	24.8	0	25.7	13	0
	10	0	17.1	0	17.5	0	17.9	0	18.4	0	18.9	0	19.4	0	20.1	0	20.7	0	21.5	12	50
	20	0	13.7	0	14.0	0	14.4	0	14.7	0	15.1	0	15.6	0	16.1	0	16.6	0	17.2		40
11	30	0	10.3	0	10.5	0	10.8	0	11.1	0	11.4	0	11.7	0	12.1	0	12.5	0	13.0	12	30
	40	0	6.9	0	7.0	0	7.2	0	7.4	0	7.6	0	7.8	0	8.1	0	8.3	0	8.6		20
	50	0	3.5	0	3.5	0	3.6	0	3.7	0	3.8	0	3.9	0	4.0	0	4.2	0	4.3		10
12	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	12	0

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.		
h	m	°	'	°	'	°	'	°	'	°	'	h	m
0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	24	0
	10	0	4.5	0	4.7	0	5.2	0	5.8	0	6.1	23	50
	20	0	9.0	0	9.4	0	10.3	0	10.9	0	11.5		40
0	30	0	13.5	0	14.1	0	14.8	0	15.5	0	16.3	23	30
	40	0	18.0	0	18.8	0	19.6	0	20.6	0	21.7		20
	50	0	22.4	0	23.4	0	24.5	0	25.7	0	27.0		10
1	0	0	26.8	0	28.0	0	29.3	0	30.7	0	32.3	23	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.		
h	m	°	'	°	'	°	'	°	'	°	'	h	m
1	0	0 26.8	0 28.0	0 29.3	0 30.7	0 32.3	0 34.2	0 36.4	0 37.6	0 38.8		23	0
	10	0 31.2	0 32.5	0 34.0	0 35.6	0 37.5	0 39.7	0 42.2	0 43.6	0 45.1		22	50
	20	0 35.4	0 36.9	0 38.6	0 40.5	0 42.7	0 45.1	0 48.0	0 49.6	0 51.3			40
1	30	0 39.6	0 41.3	0 43.2	0 45.3	0 47.7	0 50.5	0 53.7	0 55.4	0 57.3		22	30
	40	0 43.8	0 45.6	0 47.7	0 50.0	0 52.7	0 55.7	0 59.3	1 1.2	1 3.3			20
	50	0 47.8	0 49.8	0 52.1	0 54.6	0 57.5	1 0.8	1 4.7	1 6.8	1 9.1			10
2	0	0 51.7	0 53.9	0 56.4	0 59.1	1 2.3	1 5.8	1 10.0	1 12.3	1 14.7		22	0
	10	0 55.5	0 57.9	1 0.5	1 3.5	1 6.9	1 10.7	1 15.1	1 17.6	1 20.2		21	50
	20	0 59.3	1 1.8	1 4.6	1 7.7	1 11.3	1 15.4	1 20.1	1 22.8	1 25.6			40
2	30	1 2.9	1 5.5	1 8.5	1 11.9	1 15.7	1 20.0	1 25.0	1 27.8	1 30.7		21	30
	40	1 6.3	1 9.1	1 12.3	1 15.8	1 19.8	1 24.4	1 29.7	1 32.6	1 35.7			20
	50	1 9.7	1 12.6	1 15.9	1 19.6	1 23.8	1 28.6	1 34.1	1 37.2	1 40.5			10
3	0	1 12.9	1 16.0	1 19.4	1 23.3	1 27.7	1 32.7	1 38.4	1 41.6	1 45.0		21	0
	10	1 15.9	1 19.1	1 22.7	1 26.8	1 31.3	1 36.5	1 42.5	1 45.8	1 49.4		20	50
	20	1 18.8	1 22.2	1 25.9	1 30.1	1 34.8	1 40.2	1 46.4	1 49.8	1 53.5			40
3	30	1 21.6	1 25.0	1 28.9	1 33.2	1 38.1	1 43.6	1 50.0	1 53.6	1 57.4		20	30
	40	1 24.2	1 27.7	1 31.7	1 36.1	1 41.2	1 46.9	1 53.5	1 57.1	2 1.0			20
	50	1 26.6	1 30.2	1 34.3	1 38.9	1 44.0	1 49.9	1 56.7	2 0.4	2 4.5			10
4	0	1 28.9	1 32.6	1 36.7	1 41.4	1 46.7	1 52.7	1 59.7	2 3.5	2 7.6		20	0
	10	1 31.0	1 34.7	1 39.0	1 43.8	1 49.2	1 55.3	2 2.4	2 6.3	2 10.5		19	50
	20	1 32.9	1 36.7	1 41.0	1 45.9	1 51.4	1 57.7	2 4.9	2 8.9	2 13.2			40
4	30	1 34.6	1 38.5	1 42.9	1 47.9	1 53.5	1 59.8	2 7.1	2 11.2	2 15.5		19	30
	40	1 36.1	1 40.1	1 44.6	1 49.6	1 55.3	2 1.7	2 9.1	2 13.2	2 17.6			20
	50	1 37.4	1 41.5	1 46.0	1 51.1	1 56.9	2 3.4	2 10.9	2 15.0	2 19.5			10
5	0	1 38.6	1 42.7	1 47.3	1 52.4	1 58.2	2 4.8	2 12.3	2 16.5	2 21.0		19	0
	10	1 39.6	1 43.7	1 48.3	1 53.5	1 59.3	2 6.0	2 13.6	2 17.8	2 22.3		18	50
	20	1 40.3	1 44.5	1 49.1	1 54.3	2 0.2	2 6.9	2 14.5	2 18.8	2 23.3			40
5	30	1 40.9	1 45.1	1 49.7	1 55.0	2 0.9	2 7.6	2 15.2	2 19.5	2 24.1		18	30
	40	1 41.3	1 45.5	1 50.1	1 55.4	2 1.3	2 8.0	2 15.7	2 19.9	2 24.5			20
	50	1 41.5	1 45.7	1 50.3	1 55.6	2 1.5	2 8.2	2 15.9	2 20.1	2 24.7			10
6	0	1 41.5	1 45.7	1 50.3	1 55.6	2 1.5	2 8.2	2 15.8	2 20.0	2 24.6		18	0
	10	1 41.3	1 45.4	1 50.1	1 55.3	2 1.2	2 7.9	2 15.5	2 19.7	2 24.2		17	50
	20	1 40.9	1 45.0	1 49.6	1 54.8	2 0.7	2 7.3	2 14.9	2 19.1	2 23.6			40
6	30	1 40.3	1 44.4	1 49.0	1 54.2	2 0.0	2 6.5	2 14.0	2 18.2	2 22.7		17	30
	40	1 39.6	1 43.6	1 48.2	1 53.3	1 59.0	2 5.5	2 12.9	2 17.0	2 21.5			20
	50	1 38.6	1 42.6	1 47.1	1 52.1	1 57.8	2 4.3	2 11.6	2 15.6	2 20.0			10
7	0	1 37.5	1 41.4	1 45.9	1 50.8	1 56.4	2 2.8	2 10.0	2 14.0	2 18.3		17	0
	10	1 36.2	1 40.0	1 44.4	1 49.3	1 54.8	2 1.1	2 8.2	2 12.1	2 16.4		16	50
	20	1 34.7	1 38.5	1 42.8	1 47.6	1 53.0	1 59.1	2 6.1	2 10.0	2 14.2			40
7	30	1 33.0	1 36.7	1 40.9	1 45.6	1 51.0	1 57.0	2 3.8	2 7.6	2 11.7		16	30
	40	1 31.1	1 34.8	1 38.9	1 43.5	1 48.7	1 54.6	2 1.3	2 5.0	2 9.0			20
	50	1 29.1	1 32.7	1 36.7	1 41.2	1 46.3	1 52.0	1 58.6	2 2.2	2 6.1			10
8	0	1 26.9	1 30.4	1 34.3	1 38.7	1 43.6	1 49.2	1 55.6	1 59.2	2 3.0		16	0
	10	1 24.6	1 28.0	1 31.8	1 36.0	1 40.8	1 46.3	1 52.5	1 55.9	1 59.6		15	50
	20	1 22.1	1 25.4	1 29.1	1 33.2	1 37.8	1 43.1	1 49.1	1 52.4	1 56.0			40
8	30	1 19.4	1 22.6	1 26.2	1 30.2	1 34.6	1 39.7	1 45.5	1 48.7	1 52.2		15	30
	40	1 16.7	1 19.7	1 23.1	1 27.0	1 31.3	1 36.2	1 41.8	1 44.9	1 48.2			20
	50	1 13.7	1 16.7	1 19.9	1 23.6	1 27.8	1 32.5	1 37.9	1 40.8	1 44.0			10
9	0	1 10.7	1 13.5	1 16.6	1 20.1	1 24.1	1 28.6	1 33.8	1 36.6	1 39.7		15	0
	10	1 7.5	1 10.2	1 13.1	1 16.5	1 20.3	1 24.6	1 29.5	1 32.2	1 35.1		14	50
	20	1 4.1	1 6.7	1 9.5	1 12.7	1 16.3	1 20.4	1 25.1	1 27.6	1 30.4			40
9	30	1 0.7	1 3.1	1 5.8	1 8.8	1 12.2	1 16.1	1 20.5	1 22.9	1 25.5		14	30
	40	0 57.2	0 59.4	1 2.0	1 4.8	1 8.0	1 11.6	1 15.8	1 18.1	1 20.5			20
	50	0 53.5	0 55.6	0 58.0	1 0.7	1 3.6	1 7.0	1 10.9	1 13.1	1 15.4			10
10	0	0 49.8	0 51.8	0 53.9	0 56.4	0 59.2	1 2.3	1 6.0	1 8.0	1 10.1		14	0



AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
10	0	0 49.8	0 51.8	0 53.9	0 56.4	0 59.2	1 2.3	1 6.0	1 8.0	1 10.1	14	0
	10	0 46.0	0 47.8	0 49.8	0 52.1	0 54.6	0 57.5	1 0.9	1 2.7	1 4.7	13	50
	20	0 42.1	0 43.7	0 45.6	0 47.6	0 50.0	0 52.6	0 55.7	0 57.4	0 59.2		40
10	30	0 38.1	0 39.6	0 41.2	0 43.1	0 45.2	0 47.6	0 50.4	0 51.9	0 53.5	13	30
	40	0 34.0	0 35.3	0 36.8	0 38.5	0 40.4	0 42.5	0 45.0	0 46.4	0 47.8		20
	50	0 29.9	0 31.1	0 32.4	0 33.8	0 35.5	0 37.4	0 39.6	0 40.7	0 42.0		10
11	0	0 25.7	0 26.7	0 27.9	0 29.1	0 30.5	0 32.2	0 34.0	0 35.0	0 36.1	13	0
	10	0 21.5	0 22.3	0 23.3	0 24.3	0 25.5	0 26.9	0 28.5	0 29.3	0 30.2	12	50
	20	0 17.2	0 17.9	0 18.7	0 19.5	0 20.5	0 21.6	0 22.8	0 23.5	0 24.2		40
11	30	0 13.0	0 13.5	0 14.0	0 14.7	0 15.4	0 16.2	0 17.2	0 17.7	0 18.2	12	30
	40	0 8.6	0 9.0	0 9.4	0 9.8	0 10.3	0 10.8	0 11.5	0 11.8	0 12.2		20
	50	0 4.3	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 5.9	0 6.1		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 6.6	0 6.8	0 7.0	0 7.3	0 7.6	0 8.0	0 8.3	0 8.7	0 9.2	23	50
	20	0 13.1	0 13.6	0 14.1	0 14.6	0 15.2	0 15.9	0 16.6	0 17.4	0 18.3		40
0	30	0 19.6	0 20.3	0 21.1	0 21.9	0 22.8	0 23.8	0 24.9	0 26.1	0 27.4	23	30
	40	0 26.1	0 27.0	0 28.0	0 29.1	0 30.3	0 31.6	0 33.1	0 34.7	0 36.4		20
	50	0 32.5	0 33.7	0 34.9	0 36.3	0 37.8	0 39.4	0 41.2	0 43.2	0 45.4		10
1	0	0 38.8	0 40.2	0 41.7	0 43.4	0 45.2	0 47.1	0 49.2	0 51.6	0 54.2	23	0
	10	0 45.1	0 46.7	0 48.5	0 50.4	0 52.4	0 54.7	0 57.2	0 59.9	1 3.0	22	50
	20	0 51.3	0 53.1	0 55.1	0 57.2	0 59.6	1 2.2	1 5.0	1 8.1	1 11.6		40
1	30	0 57.3	0 59.4	1 1.6	1 4.0	1 6.6	1 9.5	1 12.7	1 16.1	1 20.0	22	30
	40	1 3.3	1 5.5	1 8.0	1 10.6	1 13.5	1 16.7	1 20.2	1 24.0	1 28.2		20
	50	1 9.1	1 11.5	1 14.2	1 17.1	1 20.2	1 23.7	1 27.5	1 31.7	1 36.3		10
2	0	1 14.7	1 17.4	1 20.3	1 23.4	1 26.8	1 30.5	1 34.6	1 39.2	1 44.2	22	0
	10	1 20.2	1 23.1	1 26.2	1 29.5	1 33.2	1 37.2	1 41.6	1 46.4	1 51.8	21	50
	20	1 25.6	1 28.6	1 31.9	1 35.5	1 39.4	1 43.6	1 48.3	1 53.5	1 59.2		40
2	30	1 30.7	1 33.9	1 37.4	1 41.2	1 45.3	1 49.8	1 54.8	2 0.2	2 6.3	21	30
	40	1 35.7	1 39.1	1 42.7	1 46.7	1 51.1	1 55.8	2 1.0	2 6.8	2 13.1		20
	50	1 40.5	1 44.0	1 47.8	1 52.0	1 56.6	2 1.6	2 7.0	2 13.0	2 19.7		10
3	0	1 45.0	1 48.7	1 52.7	1 57.1	2 1.9	2 7.1	2 12.7	2 19.0	2 26.0	21	0
	10	1 49.4	1 53.2	1 57.4	2 1.9	2 6.9	2 12.3	2 18.2	2 24.7	2 31.9	20	50
	20	1 53.5	1 57.5	2 1.8	2 6.5	2 11.6	2 17.2	2 23.3	2 30.1	2 37.5		40
3	30	1 57.4	2 1.5	2 6.0	2 10.8	2 16.1	2 21.9	2 28.2	2 35.1	2 42.8	20	30
	40	2 1.0	2 5.3	2 9.9	2 14.9	2 20.3	2 26.2	2 32.7	2 39.9	2 47.8		20
	50	2 4.5	2 8.8	2 13.5	2 18.6	2 24.2	2 30.3	2 37.0	2 44.3	2 52.4		10
4	0	2 7.6	2 12.1	2 16.9	2 22.1	2 27.8	2 34.0	2 40.9	2 48.4	2 56.6	20	0
	10	2 10.5	2 15.1	2 20.0	2 25.3	2 31.1	2 37.5	2 44.4	2 52.1	3 0.5	19	50
	20	2 13.2	2 17.8	2 22.8	2 28.2	2 34.1	2 40.6	2 47.7	2 55.5	3 4.0		40
4	30	2 15.5	2 20.2	2 25.3	2 30.8	2 36.8	2 43.4	2 50.6	2 58.5	3 7.2	19	30
	40	2 17.6	2 22.4	2 27.5	2 33.1	2 39.2	2 45.9	2 53.1	3 1.1	3 10.0		20
	50	2 19.5	2 24.3	2 29.5	2 35.2	2 41.3	2 48.0	2 55.4	3 3.4	3 12.4		10
5	0	2 21.0	2 25.9	2 31.2	2 36.9	2 43.1	2 49.8	2 57.2	3 5.4	3 14.4	19	0
	10	2 22.3	2 27.2	2 32.5	2 38.2	2 44.5	2 51.3	2 58.8	3 7.0	3 16.0	18	50
	20	2 23.3	2 28.2	2 33.6	2 39.3	2 45.6	2 52.5	2 59.9	3 8.2	3 17.2		40
5	30	2 24.1	2 29.0	2 34.3	2 40.1	2 46.4	2 53.3	3 0.8	3 9.0	3 18.1	18	30
	40	2 24.5	2 29.5	2 34.8	2 40.6	2 46.9	2 53.7	3 1.2	3 9.5	3 18.6		20
	50	2 24.7	2 29.6	2 35.0	2 40.8	2 47.0	2 53.9	3 1.4	3 9.6	3 18.7		10
6	0	2 24.6	2 29.5	2 34.8	2 40.6	2 46.9	2 53.7	3 1.2	3 9.4	3 18.4	18	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.		
h	m	°	'	°	'	°	'	°	'	°	'	h	m
6	0	2	24.6	2	29.5	2	34.8	2	40.6	2	46.9	2	53.7
	10	2	24.2	2	29.1	2	34.4	2	40.2	2	46.4	2	53.2
	20	2	23.6	2	28.5	2	33.7	2	39.4	2	45.6	2	52.3
6	30	2	22.7	2	27.5	2	32.7	2	38.4	2	44.5	2	51.2
	40	2	21.5	2	26.3	2	31.4	2	37.0	2	43.1	2	49.7
	50	2	20.0	2	24.8	2	29.9	2	35.4	2	41.4	2	47.9
7	0	2	18.3	2	23.0	2	28.0	2	33.5	2	39.4	2	45.8
	10	2	16.4	2	21.0	2	25.9	2	31.3	2	37.1	2	43.4
	20	2	14.2	2	18.7	2	23.5	2	28.8	2	34.5	2	40.7
7	30	2	11.7	2	16.1	2	20.9	2	26.0	2	31.6	2	37.7
	40	2	9.0	2	13.3	2	18.0	2	23.0	2	28.5	2	34.4
	50	2	6.1	2	10.3	2	14.8	2	19.7	2	25.1	2	30.8
8	0	2	3.0	2	7.1	2	11.5	2	16.2	2	21.4	2	27.0
	10	1	59.6	2	3.6	2	7.8	2	12.5	2	17.5	2	23.0
	20	1	56.0	1	59.8	2	4.0	2	8.5	2	13.3	2	18.6
8	30	1	52.2	1	55.9	1	59.9	2	4.2	2	8.9	2	14.0
	40	1	48.2	1	51.8	1	55.6	1	59.8	2	4.3	2	9.2
	50	1	44.0	1	47.5	1	51.2	1	55.2	1	59.5	2	4.2
9	0	1	39.7	1	42.9	1	46.5	1	50.3	1	54.5	1	59.0
	10	1	35.1	1	38.2	1	41.6	1	45.3	1	49.2	1	53.5
	20	1	30.4	1	33.4	1	36.6	1	40.0	1	43.8	1	47.9
9	30	1	25.5	1	28.3	1	31.4	1	34.6	1	38.2	1	42.0
	40	1	20.5	1	23.1	1	26.0	1	29.1	1	32.4	1	36.0
	50	1	15.4	1	17.8	1	20.5	1	23.4	1	26.5	1	29.9
10	0	1	10.1	1	12.4	1	14.8	1	17.5	1	20.4	1	23.5
	10	1	4.7	1	6.8	1	9.1	1	11.5	1	14.2	1	17.1
	20	0	59.2	1	1.1	1	3.2	1	5.4	1	7.8	1	10.5
10	30	0	53.5	0	55.3	0	57.2	0	59.2	1	1.4	1	3.8
	40	0	47.8	0	49.4	0	51.1	0	52.9	0	54.8	0	57.0
	50	0	42.0	0	43.4	0	44.9	0	46.5	0	48.2	0	50.1
11	0	0	36.1	0	37.3	0	38.6	0	40.0	0	41.5	0	43.1
	10	0	30.2	0	31.2	0	32.3	0	33.4	0	34.7	0	36.0
	20	0	24.2	0	25.0	0	25.9	0	26.8	0	27.8	0	28.9
11	30	0	18.2	0	18.8	0	19.4	0	20.1	0	20.9	0	21.7
	40	0	12.2	0	12.6	0	13.0	0	13.4	0	13.9	0	14.5
	50	0	6.1	0	6.3	0	6.5	0	6.7	0	7.0	0	7.2
12	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

TABLE IVa.

Table IV has been computed for a declination of 88° 52' 5". For other declinations of Polaris the correction given below should be applied to the Azimuth taken from Table IV.

Azimuth. Decl.		0'	20'	40'	60'	80'	100'	120'	140'	160'	180'	200'	Azimuth. Decl.	
° ' "		'	'	'	'	'	'	'	'	'	'	'	° ' "	
88	51 40	0.0	+0.1	+0.2	+0.4	+0.5	+0.6	+0.7	+0.8	+1.0	+1.1	+1.2	88	51 40
88	51 45	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88	51 45
88	51 50	0.0	+0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88	51 50
88	51 55	0.0	0.0	+0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	88	51 55
88	52 0	0.0	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	88	52 0
88	52 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88	52 5
88	52 10	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	88	52 10
88	52 15	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	88	52 15
88	52 20	0.0	-0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88	52 20
88	52 25	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88	52 25
88	52 30	0.0	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1	-1.2	88	52 30

## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Variation for—	
								1' of Lat.	1" of l.
• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
10 0	1 9 23.3	1 9 13.1	1 9 2.9	1 8 52.8	1 8 42.6	1 8 32.5		+0.21	-1.02
10 20	1 9 27.6	1 9 17.4	1 9 7.3	1 8 57.1	1 8 46.9	1 8 36.8		0.22	1.02
10 40	1 9 32.1	1 9 21.9	1 9 11.8	1 9 1.6	1 8 51.4	1 8 41.2		0.23	1.02
11 0	1 9 36.8	1 9 26.6	1 9 16.4	1 9 6.2	1 8 56.0	1 8 45.8		0.24	1.02
11 20	1 9 41.6	1 9 31.4	1 9 21.2	1 9 11.0	1 9 0.8	1 8 50.6		0.24	1.02
11 40	1 9 46.5	1 9 36.3	1 9 26.1	1 9 15.9	1 9 5.7	1 8 55.5		+0.25	-1.02
12 0	1 9 51.6	1 9 41.4	1 9 31.2	1 9 20.9	1 9 10.7	1 9 0.5		0.26	1.02
12 20	1 9 56.9	1 9 46.6	1 9 36.4	1 9 26.2	1 9 15.9	1 9 5.7		0.27	1.02
12 40	1 10 2.3	1 9 52.0	1 9 41.8	1 9 31.5	1 9 21.3	1 9 11.0		0.27	1.03
13 0	1 10 7.9	1 9 57.6	1 9 47.3	1 9 37.1	1 9 26.8	1 9 16.5		0.28	1.03
13 20	1 10 13.6	1 10 3.3	1 9 53.0	1 9 42.8	1 9 32.5	1 9 22.2		+0.29	-1.03
13 40	1 10 19.5	1 10 9.2	1 9 58.9	1 9 48.6	1 9 38.3	1 9 28.0		0.30	1.03
14 0	1 10 25.5	1 10 15.2	1 10 4.9	1 9 54.6	1 9 44.3	1 9 34.0		0.30	1.03
14 20	1 10 31.7	1 10 21.4	1 10 11.1	1 10 0.8	1 9 50.5	1 9 40.1		0.31	1.03
14 40	1 10 38.1	1 10 27.8	1 10 17.4	1 10 7.1	1 9 56.8	1 9 46.4		0.32	1.03
15 0	1 10 44.6	1 10 34.3	1 10 23.9	1 10 13.6	1 10 3.2	1 9 52.9		+0.33	-1.03
15 20	1 10 51.4	1 10 41.0	1 10 30.6	1 10 20.2	1 10 9.9	1 9 59.5		0.34	1.04
15 40	1 10 58.2	1 10 47.8	1 10 37.4	1 10 27.1	1 10 16.7	1 10 6.3		0.34	1.04
16 0	1 11 5.2	1 10 54.8	1 10 44.4	1 10 34.0	1 10 23.6	1 10 13.2		0.35	1.04
16 20	1 11 12.4	1 11 2.0	1 10 51.6	1 10 41.2	1 10 30.8	1 10 20.3		0.36	1.04
16 40	1 11 19.8	1 11 9.4	1 10 58.9	1 10 48.5	1 10 38.1	1 10 27.6		+0.37	-1.04
17 0	1 11 27.4	1 11 16.9	1 11 6.4	1 10 56.0	1 10 45.5	1 10 35.1		0.38	1.05
17 20	1 11 35.1	1 11 24.6	1 11 14.1	1 11 3.6	1 10 53.2	1 10 42.7		0.39	1.05
17 40	1 11 43.0	1 11 32.5	1 11 22.0	1 11 11.5	1 11 1.0	1 10 50.5		0.40	1.05
18 0	1 11 51.0	1 11 40.5	1 11 30.0	1 11 19.5	1 11 9.0	1 10 58.5		0.40	1.05
18 20	1 11 59.3	1 11 48.7	1 11 38.2	1 11 27.7	1 11 17.1	1 11 6.6		+0.41	-1.05
18 40	1 12 7.7	1 11 57.1	1 11 46.6	1 11 36.0	1 11 25.5	1 11 14.9		0.42	1.06
19 0	1 12 16.3	1 12 5.7	1 11 55.1	1 11 44.5	1 11 34.0	1 11 23.4		0.43	1.06
19 20	1 12 25.1	1 12 14.5	1 12 3.9	1 11 53.3	1 11 42.7	1 11 32.1		0.44	1.06
19 40	1 12 34.0	1 12 23.4	1 12 12.8	1 12 2.2	1 11 51.5	1 11 40.9		0.45	1.06
20 0	1 12 43.2	1 12 32.5	1 12 21.9	1 12 11.2	1 12 0.6	1 11 50.0		+0.46	-1.06
20 20	1 12 52.5	1 12 41.8	1 12 31.2	1 12 20.5	1 12 9.8	1 11 59.2		0.47	1.07
20 40	1 13 2.0	1 12 51.3	1 12 40.7	1 12 30.0	1 12 19.3	1 12 8.6		0.48	1.07
21 0	1 13 11.7	1 13 1.0	1 12 50.3	1 12 39.6	1 12 28.9	1 12 18.2		0.49	1.07
21 20	1 13 21.6	1 13 10.9	1 13 0.2	1 12 49.4	1 12 38.7	1 12 28.0		0.50	1.07
21 40	1 13 31.7	1 13 21.0	1 13 10.2	1 12 59.5	1 12 48.7	1 12 37.9		+0.51	-1.08
22 0	1 13 42.0	1 13 31.2	1 13 20.5	1 13 9.7	1 12 58.9	1 12 48.1		0.52	1.08
22 20	1 13 52.5	1 13 41.7	1 13 30.9	1 13 20.1	1 13 9.3	1 12 58.5		0.53	1.08
22 40	1 14 3.2	1 13 52.4	1 13 41.6	1 13 30.7	1 13 19.9	1 13 9.0		0.54	1.08
23 0	1 14 14.1	1 14 3.3	1 13 52.4	1 13 41.5	1 13 30.7	1 13 19.8		0.55	1.09
23 20	1 14 25.2	1 14 14.3	1 14 3.4	1 13 52.6	1 13 41.7	1 13 30.8		+0.56	-1.09
23 40	1 14 36.5	1 14 25.6	1 14 14.7	1 14 3.8	1 13 52.9	1 13 42.0		0.57	1.09
24 0	1 14 48.1	1 14 37.1	1 14 26.2	1 14 15.2	1 14 4.3	1 13 53.3		0.58	1.10
24 20	1 14 59.8	1 14 48.8	1 14 37.9	1 14 26.9	1 14 15.9	1 14 4.9		0.59	1.10
24 40	1 15 11.8	1 15 0.8	1 14 49.7	1 14 38.7	1 14 27.7	1 14 16.7		0.60	1.10
25 0	1 15 23.9	1 15 12.9	1 15 1.8	1 14 50.8	1 14 39.8	1 14 28.7		+0.61	-1.10
25 20	1 15 36.3	1 15 25.2	1 15 14.2	1 15 3.1	1 14 52.0	1 14 41.0		0.62	1.11
25 40	1 15 48.9	1 15 37.8	1 15 26.7	1 15 15.6	1 15 4.5	1 14 53.4		0.63	1.11
26 0	1 16 1.7	1 15 50.6	1 15 39.5	1 15 28.4	1 15 17.2	1 15 6.1		0.64	1.11
26 20	1 16 14.8	1 16 3.6	1 15 52.5	1 15 41.3	1 15 30.2	1 15 19.0		0.65	1.12
26 40	1 16 28.1	1 16 16.9	1 16 5.7	1 15 54.5	1 15 43.3	1 15 32.1		+0.67	-1.12
27 0	1 16 41.6	1 16 30.4	1 16 19.2	1 16 7.9	1 15 56.7	1 15 45.5		0.68	1.12
27 20	1 16 55.4	1 16 44.1	1 16 32.9	1 16 21.6	1 16 10.3	1 15 59.1		0.69	1.13
27 40	1 17 9.4	1 16 58.1	1 16 46.8	1 16 35.5	1 16 24.2	1 16 12.9		0.70	1.13
28 0	1 17 23.6	1 17 12.3	1 17 1.0	1 16 49.6	1 16 38.3	1 16 27.0		0.71	1.13
28 20	1 17 38.1	1 17 26.8	1 17 15.4	1 17 4.0	1 16 52.7	1 16 41.3		+0.73	-1.14
28 40	1 17 52.8	1 17 41.5	1 17 30.1	1 17 18.7	1 17 7.3	1 16 55.9		0.74	1.14
29 0	1 18 7.8	1 17 56.4	1 17 45.0	1 17 33.5	1 17 22.1	1 17 10.7		0.75	1.14
29 20	1 18 23.1	1 18 11.6	1 18 0.2	1 17 48.7	1 17 37.2	1 17 25.7		0.76	1.15
29 40	1 18 38.6	1 18 27.1	1 18 15.6	1 18 4.1	1 17 52.6	1 17 41.0		0.78	1.15
30 0	1 18 54.4	1 18 42.8	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6		+0.79	-1.16

AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	1' of Lat.	1'' of $\delta$ .
• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
30 0	1 18 54.4	1 18 42.8	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6	+0.79	-1.16
30 10	1 19 2.4	1 18 50.8	1 18 39.2	1 18 27.7	1 18 16.1	1 18 4.5	0.80	1.16
30 20	1 19 10.4	1 18 58.8	1 18 47.2	1 18 35.7	1 18 24.1	1 18 12.5	0.80	1.16
30 30	1 19 18.5	1 19 6.9	1 18 55.3	1 18 43.7	1 18 32.1	1 18 20.5	0.81	1.16
30 40	1 19 26.7	1 19 15.1	1 19 3.5	1 18 51.8	1 18 40.2	1 18 28.6	0.82	1.16
30 50	1 19 35.0	1 19 23.3	1 19 11.7	1 19 0.0	1 18 48.4	1 18 36.8	+0.82	-1.16
31 0	1 19 43.3	1 19 31.6	1 19 20.0	1 19 8.3	1 18 56.6	1 18 45.0	0.83	1.17
31 10	1 19 51.7	1 19 40.0	1 19 28.3	1 19 16.6	1 19 4.9	1 18 53.3	0.84	1.17
31 20	1 20 0.2	1 19 48.5	1 19 36.8	1 19 25.0	1 19 13.3	1 19 1.6	0.85	1.17
31 30	1 20 8.7	1 19 57.0	1 19 45.3	1 19 33.5	1 19 21.8	1 19 10.1	0.85	1.17
31 40	1 20 17.3	1 20 5.6	1 19 53.8	1 19 42.1	1 19 30.3	1 19 18.6	+0.86	-1.17
31 50	1 20 26.0	1 20 14.2	1 20 2.5	1 19 50.7	1 19 38.9	1 19 27.2	0.87	1.18
32 0	1 20 34.8	1 20 23.0	1 20 11.2	1 19 59.4	1 19 47.6	1 19 35.8	0.87	1.18
32 10	1 20 43.6	1 20 31.8	1 20 19.9	1 20 8.1	1 19 56.3	1 19 44.5	0.88	1.18
32 20	1 20 52.5	1 20 40.6	1 20 28.8	1 20 17.0	1 20 5.1	1 19 53.3	0.89	1.18
32 30	1 21 1.5	1 20 49.6	1 20 37.7	1 20 25.9	1 20 14.0	1 20 2.2	+0.90	-1.19
32 40	1 21 10.5	1 20 58.6	1 20 46.7	1 20 34.9	1 20 23.0	1 20 11.1	0.90	1.19
32 50	1 21 19.6	1 21 7.7	1 20 55.8	1 20 43.9	1 20 32.0	1 20 20.1	0.91	1.19
33 0	1 21 28.8	1 21 16.9	1 21 5.0	1 20 53.1	1 20 41.1	1 20 29.2	0.92	1.19
33 10	1 21 38.1	1 21 26.2	1 21 14.2	1 21 2.3	1 20 50.3	1 20 38.4	0.92	1.19
33 20	1 21 47.4	1 21 35.5	1 21 23.5	1 21 11.5	1 20 59.6	1 20 47.6	+0.93	-1.20
33 30	1 21 56.9	1 21 44.9	1 21 32.9	1 21 20.9	1 21 8.9	1 20 56.9	0.94	1.20
33 40	1 22 6.4	1 21 54.4	1 21 42.4	1 21 30.3	1 21 18.3	1 21 6.3	0.95	1.20
33 50	1 22 16.0	1 22 3.9	1 21 51.9	1 21 39.9	1 21 27.8	1 21 15.8	0.96	1.20
34 0	1 22 25.6	1 22 13.6	1 22 1.5	1 21 49.5	1 21 37.4	1 21 25.3	0.96	1.21
34 10	1 22 35.4	1 22 23.3	1 22 11.2	1 21 59.1	1 21 47.0	1 21 34.9	+0.97	-1.21
34 20	1 22 45.2	1 22 33.1	1 22 21.0	1 22 8.9	1 21 56.8	1 21 44.6	0.98	1.21
34 30	1 22 55.1	1 22 43.0	1 22 30.9	1 22 18.7	1 22 6.6	1 21 54.4	0.99	1.21
34 40	1 23 5.1	1 22 53.0	1 22 40.8	1 22 28.6	1 22 16.5	1 22 4.3	1.00	1.22
34 50	1 23 15.2	1 23 3.0	1 22 50.8	1 22 38.6	1 22 26.5	1 22 14.3	1.00	1.22
35 0	1 23 25.3	1 23 13.1	1 23 0.9	1 22 48.7	1 22 36.5	1 22 24.3	+1.01	-1.22
35 10	1 23 35.6	1 23 23.4	1 23 11.1	1 22 58.9	1 22 46.6	1 22 34.4	1.02	1.22
35 20	1 23 45.9	1 23 33.6	1 23 21.4	1 23 9.1	1 22 56.9	1 22 44.6	1.03	1.23
35 30	1 23 56.3	1 23 44.0	1 23 31.7	1 23 19.5	1 23 7.2	1 22 54.9	1.04	1.23
35 40	1 24 6.8	1 23 54.5	1 23 42.2	1 23 29.9	1 23 17.6	1 23 5.3	1.05	1.23
35 50	1 24 17.4	1 24 5.0	1 23 52.7	1 23 40.4	1 23 28.0	1 23 15.7	+1.06	-1.23
36 0	1 24 28.0	1 24 15.7	1 24 3.3	1 23 51.0	1 23 38.6	1 23 26.2	1.06	1.24
36 10	1 24 38.8	1 24 26.4	1 24 14.0	1 24 1.6	1 23 49.3	1 23 36.9	1.07	1.24
36 20	1 24 49.6	1 24 37.2	1 24 24.8	1 24 12.4	1 24 0.0	1 23 47.6	1.08	1.24
36 30	1 25 0.6	1 24 48.2	1 24 35.7	1 24 23.3	1 24 10.8	1 23 58.4	1.09	1.24
36 40	1 25 11.6	1 24 59.2	1 24 46.7	1 24 34.2	1 24 21.7	1 24 9.3	+1.10	-1.25
36 50	1 25 22.7	1 25 10.2	1 24 57.7	1 24 45.2	1 24 32.7	1 24 20.2	1.11	1.25
37 0	1 25 34.0	1 25 21.4	1 25 8.9	1 24 56.4	1 24 43.9	1 24 31.3	1.12	1.25
37 10	1 25 45.2	1 25 32.7	1 25 20.1	1 25 7.6	1 24 55.1	1 24 42.5	1.13	1.25
37 20	1 25 56.6	1 25 44.1	1 25 31.5	1 25 18.9	1 25 6.3	1 24 53.8	1.14	1.26
37 30	1 26 8.1	1 25 55.5	1 25 42.9	1 25 30.3	1 25 17.7	1 25 5.1	+1.15	-1.26
37 40	1 26 19.7	1 26 7.1	1 25 54.5	1 25 41.8	1 25 29.2	1 25 16.5	1.16	1.26
37 50	1 26 31.4	1 26 18.7	1 26 6.1	1 25 53.4	1 25 40.8	1 25 28.1	1.16	1.27
38 0	1 26 43.2	1 26 30.5	1 26 17.8	1 26 5.1	1 25 52.4	1 25 39.7	1.17	1.27
38 10	1 26 55.1	1 26 42.3	1 26 29.6	1 26 16.9	1 26 4.2	1 25 51.5	1.18	1.27
38 20	1 27 7.0	1 26 54.3	1 26 41.5	1 26 28.8	1 26 16.0	1 26 3.3	+1.19	-1.27
38 30	1 27 19.1	1 27 6.3	1 26 53.5	1 26 40.8	1 26 28.0	1 26 15.2	1.20	1.28
38 40	1 27 31.3	1 27 18.5	1 27 5.7	1 26 52.9	1 26 40.0	1 26 27.2	1.21	1.28
38 50	1 27 43.6	1 27 30.7	1 27 17.9	1 27 5.0	1 26 52.2	1 26 39.4	1.22	1.28
39 0	1 27 55.9	1 27 43.1	1 27 30.2	1 27 17.3	1 27 4.5	1 26 51.6	1.23	1.29
39 10	1 28 8.4	1 27 55.5	1 27 42.6	1 27 29.7	1 27 16.8	1 27 3.9	+1.24	-1.29
39 20	1 28 21.0	1 28 8.1	1 27 55.1	1 27 42.2	1 27 29.3	1 27 16.4	1.26	1.29
39 30	1 28 33.7	1 28 20.7	1 28 7.8	1 27 54.8	1 27 41.9	1 27 28.9	1.27	1.30
39 40	1 28 46.5	1 28 33.5	1 28 20.5	1 28 7.5	1 27 54.5	1 27 41.5	1.28	1.30
39 50	1 28 59.4	1 28 46.4	1 28 33.4	1 28 20.3	1 28 7.3	1 27 54.3	1.29	1.30
40 0	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	+1.30	-1.31

AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	1' of Lat.	1'' of L.
• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
40 0	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	+1.30	−1.31
40 10	1 29 25.5	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.1	1.31	1.31
40 20	1 29 38.8	1 29 25.7	1 29 12.5	1 28 59.4	1 28 46.3	1 28 33.2	1.32	1.31
40 30	1 29 52.1	1 29 39.0	1 29 25.8	1 29 12.7	1 28 59.5	1 28 46.4	1.33	1.31
40 40	1 30 5.6	1 29 52.4	1 29 39.2	1 29 26.0	1 29 12.8	1 28 59.6	1.34	1.32
40 50	1 30 19.1	1 30 5.9	1 29 52.7	1 29 39.5	1 29 26.3	1 29 13.0	+1.35	−1.32
41 0	1 30 32.8	1 30 19.6	1 30 6.3	1 29 53.1	1 29 39.8	1 29 26.6	1.37	1.32
41 10	1 30 46.6	1 30 33.3	1 30 20.1	1 30 6.8	1 29 53.5	1 29 40.2	1.38	1.33
41 20	1 31 0.5	1 30 47.2	1 30 33.9	1 30 20.6	1 30 7.3	1 29 53.9	1.39	1.33
41 30	1 31 14.6	1 31 1.2	1 30 47.9	1 30 34.5	1 30 21.2	1 30 7.8	1.40	1.34
41 40	1 31 28.7	1 31 15.3	1 31 2.0	1 30 48.6	1 30 35.2	1 30 21.8	+1.41	−1.34
41 50	1 31 43.0	1 31 29.6	1 31 16.2	1 31 2.7	1 30 49.3	1 30 35.9	1.42	1.34
42 0	1 31 57.4	1 31 43.9	1 31 30.5	1 31 17.0	1 31 3.6	1 30 50.1	1.43	1.35
42 10	1 32 11.9	1 31 58.4	1 31 44.9	1 31 31.4	1 31 17.9	1 31 4.4	1.45	1.35
42 20	1 32 26.5	1 32 13.0	1 31 59.5	1 31 46.0	1 31 32.4	1 31 18.9	1.46	1.35
42 30	1 32 41.3	1 32 27.7	1 32 14.2	1 32 0.6	1 31 47.0	1 31 33.5	+1.47	−1.36
42 40	1 32 56.2	1 32 42.6	1 32 29.0	1 32 15.4	1 32 1.8	1 31 48.2	1.48	1.36
42 50	1 33 11.2	1 32 57.6	1 32 43.9	1 32 30.3	1 32 16.7	1 32 3.0	1.50	1.36
43 0	1 33 26.4	1 33 12.7	1 32 59.0	1 32 45.3	1 32 31.7	1 32 18.0	1.51	1.37
43 10	1 33 41.6	1 33 27.9	1 33 14.2	1 33 0.5	1 32 46.8	1 32 33.1	1.52	1.37
43 20	1 33 57.0	1 33 43.3	1 33 29.5	1 33 15.8	1 33 2.0	1 32 48.3	+1.54	−1.37
43 30	1 34 12.6	1 33 58.8	1 33 45.0	1 33 31.2	1 33 17.4	1 33 3.6	1.55	1.38
43 40	1 34 28.3	1 34 14.4	1 34 0.6	1 33 46.8	1 33 33.0	1 33 19.1	1.56	1.38
43 50	1 34 44.1	1 34 30.2	1 34 16.3	1 34 2.5	1 33 48.6	1 33 34.7	1.58	1.39
44 0	1 35 0.0	1 34 46.1	1 34 32.2	1 34 18.3	1 34 4.4	1 33 50.5	1.59	1.39
44 10	1 35 16.1	1 35 2.2	1 34 48.2	1 34 34.3	1 34 20.3	1 34 6.4	+1.61	−1.39
44 20	1 35 32.3	1 35 18.4	1 35 4.4	1 34 50.4	1 34 36.4	1 34 22.4	1.62	1.40
44 30	1 35 48.7	1 35 34.7	1 35 20.7	1 35 6.6	1 34 52.6	1 34 38.6	1.63	1.40
44 40	1 36 5.2	1 35 51.2	1 35 37.1	1 35 23.0	1 35 9.0	1 34 54.9	1.64	1.41
44 50	1 36 21.9	1 36 7.8	1 35 53.6	1 35 39.5	1 35 25.4	1 35 11.3	1.66	1.41
45 0	1 36 38.7	1 36 24.5	1 36 10.4	1 35 56.2	1 35 42.1	1 35 27.9	+1.68	−1.42
45 10	1 36 55.6	1 36 41.4	1 36 27.2	1 36 13.0	1 35 58.9	1 35 44.7	1.69	1.42
45 20	1 37 12.7	1 36 58.5	1 36 44.2	1 36 30.0	1 36 15.8	1 36 1.6	1.71	1.42
45 30	1 37 29.9	1 37 15.7	1 37 1.4	1 36 47.1	1 36 32.9	1 36 18.6	1.72	1.43
45 40	1 37 47.3	1 37 33.0	1 37 18.7	1 37 4.4	1 36 50.1	1 36 35.8	1.74	1.43
45 50	1 38 4.9	1 37 50.5	1 37 36.2	1 37 21.8	1 37 7.5	1 36 53.1	+1.75	−1.44
46 0	1 38 22.6	1 38 8.2	1 37 53.8	1 37 39.4	1 37 25.0	1 37 10.6	1.77	1.44
46 10	1 38 40.5	1 38 26.0	1 38 11.6	1 37 57.1	1 37 42.7	1 37 28.3	1.78	1.44
46 20	1 38 58.5	1 38 44.0	1 38 29.5	1 38 15.0	1 38 0.5	1 37 46.1	1.80	1.45
46 30	1 39 16.7	1 39 2.1	1 38 47.6	1 38 33.1	1 38 18.5	1 38 4.0	1.82	1.45
46 40	1 39 35.0	1 39 20.4	1 39 5.9	1 38 51.3	1 38 36.7	1 38 22.1	+1.83	−1.46
46 50	1 39 53.5	1 39 38.9	1 39 24.3	1 39 9.7	1 38 55.0	1 38 40.4	1.85	1.46
47 0	1 40 12.2	1 39 57.5	1 39 42.9	1 39 28.2	1 39 13.5	1 38 58.9	1.86	1.47
47 10	1 40 31.0	1 40 16.3	1 40 1.6	1 39 46.9	1 39 32.2	1 39 17.5	1.88	1.47
47 20	1 40 50.1	1 40 35.3	1 40 20.5	1 40 5.8	1 39 51.0	1 39 36.3	1.90	1.48
47 30	1 41 9.2	1 40 54.4	1 40 39.6	1 40 24.8	1 40 10.0	1 39 55.2	+1.92	−1.48
47 40	1 41 28.6	1 41 13.8	1 40 58.9	1 40 44.0	1 40 29.2	1 40 14.3	1.93	1.49
47 50	1 41 48.1	1 41 33.2	1 41 18.3	1 41 3.4	1 40 48.5	1 40 33.6	1.95	1.49
48 0	1 42 7.8	1 41 52.9	1 41 38.0	1 41 23.0	1 41 8.1	1 40 53.1	1.97	1.49
48 10	1 42 27.7	1 42 12.8	1 41 57.8	1 41 42.8	1 41 27.8	1 41 12.8	1.98	1.50
48 20	1 42 47.8	1 42 32.8	1 42 17.7	1 42 2.7	1 41 47.6	1 41 32.6	+2.00	−1.50
48 30	1 43 8.1	1 42 53.0	1 42 37.9	1 42 22.8	1 42 7.7	1 41 52.6	2.02	1.51
48 40	1 43 28.5	1 43 13.4	1 42 58.2	1 42 43.1	1 42 27.9	1 42 12.8	2.04	1.51
48 50	1 43 49.2	1 43 34.0	1 43 18.8	1 43 3.6	1 42 48.4	1 42 33.2	2.06	1.52
49 0	1 44 10.0	1 43 54.7	1 43 39.5	1 43 24.2	1 43 9.0	1 42 53.8	2.08	1.52
49 10	1 44 31.0	1 44 15.7	1 44 0.4	1 43 45.1	1 43 29.8	1 43 14.5	+2.10	−1.53
49 20	1 44 52.2	1 44 36.9	1 44 21.5	1 44 6.2	1 43 50.8	1 43 35.5	2.12	1.53
49 30	1 45 13.6	1 44 58.2	1 44 42.8	1 44 27.4	1 44 12.0	1 43 56.6	2.14	1.54
49 40	1 45 35.2	1 45 19.8	1 45 4.3	1 44 48.9	1 44 33.4	1 44 18.0	2.16	1.54
49 50	1 45 57.0	1 45 41.5	1 45 26.0	1 45 10.5	1 44 55.0	1 44 39.5	2.18	1.55
50 0	1 46 19.1	1 46 3.5	1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	+2.20	−1.56



AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	1' of Lat.	1'' of δ.
• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
50 0	1 46 19.1	1 46 3.5	1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	+2.20	-1.56
50 10	1 46 41.3	1 46 25.7	1 46 10.1	1 45 54.4	1 45 38.8	1 45 23.2	2.22	1.56
50 20	1 47 3.7	1 46 48.1	1 46 32.4	1 46 16.7	1 46 1.1	1 45 45.4	2.24	1.57
50 30	1 47 26.4	1 47 10.6	1 46 54.9	1 46 39.2	1 46 23.5	1 46 7.7	2.26	1.57
50 40	1 47 49.2	1 47 33.5	1 47 17.7	1 47 1.9	1 46 46.1	1 46 30.3	2.28	1.58
50 50	1 48 12.3	1 47 56.5	1 47 40.6	1 47 24.8	1 47 9.0	1 46 53.1	+2.30	-1.58
51 0	1 48 35.6	1 48 19.7	1 48 3.8	1 47 47.9	1 47 32.0	1 47 16.1	2.33	1.59
51 10	1 48 59.1	1 48 43.2	1 48 27.2	1 48 11.3	1 47 55.3	1 47 39.4	2.35	1.59
51 20	1 49 22.9	1 49 6.9	1 48 50.9	1 48 34.9	1 48 18.9	1 48 2.9	2.37	1.60
51 30	1 49 46.9	1 49 30.8	1 49 14.7	1 48 58.7	1 48 42.6	1 48 26.5	2.39	1.61
51 40	1 50 11.1	1 49 55.0	1 49 38.8	1 49 22.7	1 49 6.6	1 48 50.4	+2.42	-1.61
51 50	1 50 35.5	1 50 19.4	1 50 3.2	1 49 47.0	1 49 30.8	1 49 14.6	2.44	1.62
52 0	1 51 0.2	1 50 44.0	1 50 27.7	1 50 11.5	1 49 55.2	1 49 39.0	2.46	1.62
52 10	1 51 25.1	1 51 8.8	1 50 52.5	1 50 36.2	1 50 19.9	1 50 3.6	2.49	1.63
52 20	1 51 50.3	1 51 34.0	1 51 17.6	1 51 1.2	1 50 44.8	1 50 28.5	2.51	1.64
52 30	1 52 15.7	1 51 59.3	1 51 42.9	1 51 26.4	1 51 10.0	1 50 53.6	+2.54	-1.64
52 40	1 52 41.4	1 52 24.9	1 52 8.4	1 51 51.9	1 51 35.4	1 51 18.9	2.56	1.65
52 50	1 53 7.3	1 52 50.8	1 52 34.2	1 52 17.7	1 52 1.1	1 51 44.5	2.59	1.66
53 0	1 53 33.5	1 53 16.9	1 53 0.3	1 52 43.6	1 52 27.0	1 52 10.4	2.61	1.66
53 10	1 54 0.0	1 53 43.3	1 53 26.6	1 53 9.9	1 52 53.2	1 52 36.5	2.64	1.67
53 20	1 54 26.7	1 54 9.9	1 53 53.2	1 53 36.4	1 53 19.7	1 53 2.9	+2.67	-1.68
53 30	1 54 53.6	1 54 36.8	1 54 20.0	1 54 3.2	1 53 46.4	1 53 29.6	2.69	1.68
53 40	1 55 20.9	1 55 4.0	1 54 47.1	1 54 30.2	1 54 13.4	1 53 56.5	2.72	1.69
53 50	1 55 48.4	1 55 31.5	1 55 14.5	1 54 57.6	1 54 40.6	1 54 23.7	2.75	1.69
54 0	1 56 16.2	1 55 59.2	1 55 42.2	1 55 25.1	1 55 8.1	1 54 51.1	2.78	1.70
54 10	1 56 44.3	1 56 27.2	1 56 10.1	1 55 53.0	1 55 35.9	1 55 18.8	+2.80	-1.71
54 20	1 57 12.7	1 56 55.5	1 56 38.3	1 56 21.2	1 56 4.0	1 55 46.9	2.83	1.72
54 30	1 57 41.3	1 57 24.1	1 57 6.9	1 56 49.6	1 56 32.4	1 56 15.2	2.86	1.72
54 40	1 58 10.3	1 57 53.0	1 57 35.7	1 57 18.4	1 57 1.1	1 56 43.8	2.89	1.73
54 50	1 58 39.5	1 58 22.2	1 58 4.8	1 57 47.4	1 57 30.1	1 57 12.7	2.92	1.74
55 0	1 59 9.1	1 58 51.6	1 58 34.2	1 58 16.8	1 57 59.3	1 57 41.9	+2.95	-1.74
55 10	1 59 39.0	1 59 21.4	1 59 3.9	1 58 46.4	1 58 28.9	1 58 11.4	2.98	1.75
55 20	2 0 9.1	1 59 51.6	1 59 34.0	1 59 16.4	1 58 58.8	1 58 41.2	3.01	1.76
55 30	2 0 39.6	2 0 22.0	2 0 4.3	1 59 46.6	1 59 29.0	1 59 11.4	3.04	1.76
55 40	2 1 10.4	2 0 52.7	2 0 35.0	2 0 17.2	1 59 59.5	1 59 41.8	3.08	1.77
55 50	2 1 41.6	2 1 23.8	2 1 6.0	2 0 48.1	2 0 30.3	2 0 12.5	+3.11	-1.78
56 0	2 2 13.1	2 1 55.2	2 1 37.3	2 1 19.4	2 1 1.5	2 0 43.6	3.14	1.79
56 10	2 2 44.9	2 2 26.9	2 2 8.9	2 1 51.0	2 1 33.0	2 1 15.0	3.18	1.80
56 20	2 3 17.0	2 2 59.0	2 2 40.9	2 2 22.9	2 2 4.8	2 1 46.8	3.21	1.80
56 30	2 3 49.5	2 3 31.4	2 3 13.2	2 2 55.1	2 2 37.0	2 2 18.9	3.24	1.81
56 40	2 4 22.3	2 4 4.1	2 3 45.9	2 3 27.7	2 3 9.5	2 2 51.3	+3.28	-1.82
56 50	2 4 55.5	2 4 37.2	2 4 19.0	2 4 0.7	2 3 42.4	2 3 24.1	3.32	1.83
57 0	2 5 29.1	2 5 10.7	2 4 52.4	2 4 34.0	2 4 15.6	2 3 57.2	3.35	1.84
57 10	2 6 3.0	2 5 44.6	2 5 26.1	2 5 7.7	2 4 49.2	2 4 30.8	3.38	1.84
57 20	2 6 37.3	2 6 18.8	2 6 0.2	2 5 41.7	2 5 23.2	2 5 4.6	3.42	1.85
57 30	2 7 12.0	2 6 53.4	2 6 34.7	2 6 16.1	2 5 57.5	2 5 38.9	+3.46	-1.86
57 40	2 7 47.0	2 7 28.3	2 7 9.6	2 6 50.9	2 6 32.2	2 6 13.5	3.50	1.87
57 50	2 8 22.5	2 8 3.7	2 7 44.9	2 7 26.1	2 7 7.3	2 6 48.5	3.54	1.88
58 0	2 8 58.3	2 8 39.4	2 8 20.6	2 8 1.7	2 7 42.8	2 7 23.9	3.58	1.89
58 10	2 9 34.6	2 9 15.6	2 8 56.6	2 8 37.7	2 8 18.7	2 7 59.7	3.62	1.90
58 20	2 10 11.2	2 9 52.2	2 9 33.1	2 9 14.0	2 8 55.0	2 8 35.9	+3.66	-1.91
58 30	2 10 48.3	2 10 29.1	2 10 10.0	2 9 50.8	2 9 31.7	2 9 12.6	3.71	1.91
58 40	2 11 25.8	2 11 6.5	2 10 47.3	2 10 28.1	2 10 8.8	2 9 49.6	3.75	1.92
58 50	2 12 3.7	2 11 44.4	2 11 25.0	2 11 5.7	2 10 46.4	2 10 27.0	3.79	1.93
59 0	2 12 42.0	2 12 22.6	2 12 3.2	2 11 43.8	2 11 24.3	2 11 4.9	3.84	1.94
59 10	2 13 20.8	2 13 1.3	2 12 41.8	2 12 22.3	2 12 2.7	2 11 43.2	+3.88	-1.95
59 20	2 14 0.0	2 13 40.4	2 13 20.8	2 13 1.2	2 12 41.6	2 12 22.0	3.92	1.96
59 30	2 14 39.7	2 14 20.0	2 14 0.3	2 13 40.6	2 13 20.9	2 13 1.2	3.97	1.97
59 40	2 15 19.9	2 15 0.1	2 14 40.3	2 14 20.5	2 14 0.6	2 13 40.8	4.02	1.98
59 50	2 16 0.5	2 15 40.6	2 15 20.7	2 15 0.8	2 14 40.9	2 14 21.0	4.06	1.99
60 0	2 16 41.6	2 16 21.6	2 16 1.6	2 15 41.6	2 15 21.6	2 15 1.6	+4.11	-2.00

AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.	88° 51' 40''		88° 51' 50''		88° 52' 0''		88° 52' 10''		88° 52' 20''		88° 52' 30''		Variation for—	
													1' of Lat.	1" of Lt.
• /	• /	• /	• /	• /	• /	• /	• /	• /	• /	• /	• /	• /	• /	• /
60 0	2 16	41.6	2 16	21.6	2 16	1.6	2 15	41.6	2 15	21.6	2 15	1.6	+4.11	-2.00
60 10	2 17	23.2	2 17	3.1	2 16	43.0	2 16	22.9	2 16	2.8	2 15	42.6	4.16	2.01
60 20	2 18	5.3	2 17	45.1	2 17	24.9	2 17	4.6	2 16	44.4	2 16	24.2	4.21	2.02
60 30	2 18	47.9	2 18	27.6	2 18	7.2	2 17	46.9	2 17	26.6	2 17	6.3	4.26	2.03
60 40	2 19	31.0	2 19	10.6	2 18	50.1	2 18	29.7	2 18	9.3	2 17	48.8	4.31	2.04
60 50	2 20	14.6	2 19	54.1	2 19	33.5	2 19	13.0	2 18	52.5	2 18	31.9	+4.36	-2.05
61 0	2 20	58.7	2 20	38.1	2 20	17.5	2 19	56.8	2 19	36.2	2 19	15.5	4.42	2.06
61 10	2 21	43.4	2 21	22.7	2 21	1.9	2 20	41.2	2 20	20.4	2 19	59.7	4.47	2.07
61 20	2 22	28.6	2 22	7.8	2 21	46.9	2 21	26.1	2 21	5.2	2 20	44.4	4.52	2.08
61 30	2 23	14.4	2 22	53.5	2 22	32.5	2 22	11.5	2 21	50.6	2 21	29.6	4.58	2.10
61 40	2 24	0.8	2 23	39.7	2 23	18.6	2 22	57.5	2 22	36.5	2 22	15.4	+4.64	-2.11
61 50	2 24	47.7	2 24	26.5	2 24	5.3	2 23	44.1	2 23	23.0	2 23	1.8	4.70	2.12
62 0	2 25	35.3	2 25	13.9	2 24	52.6	2 24	31.3	2 24	10.0	2 23	48.7	4.76	2.13
62 10	2 26	23.4	2 26	1.9	2 25	40.5	2 25	19.1	2 24	57.6	2 24	36.2	4.81	2.14
62 20	2 27	12.1	2 26	50.6	2 26	29.0	2 26	7.4	2 25	45.9	2 25	24.3	4.87	2.16
62 30	2 28	1.4	2 27	39.8	2 27	18.1	2 26	56.4	2 26	34.8	2 26	13.1	+4.94	-2.17
62 40	2 28	51.4	2 28	29.6	2 28	7.8	2 27	46.0	2 27	24.3	2 27	2.5	5.00	2.18
62 50	2 29	42.0	2 29	20.1	2 28	58.2	2 28	36.3	2 28	14.4	2 27	52.5	5.06	2.19
63 0	2 30	33.3	2 30	11.3	2 29	49.2	2 29	27.2	2 29	5.1	2 28	43.1	5.13	2.20
63 10	2 31	25.3	2 31	3.1	2 30	40.9	2 30	18.8	2 29	56.6	2 29	34.4	5.20	2.22
63 20	2 32	17.9	2 31	55.6	2 31	33.3	2 31	11.0	2 30	48.7	2 30	26.4	+5.26	-2.23
63 30	2 33	11.2	2 32	48.8	2 32	26.3	2 32	3.9	2 31	41.5	2 31	19.0	5.33	2.24
63 40	2 34	5.2	2 33	42.6	2 33	20.1	2 32	57.5	2 32	35.0	2 32	12.4	5.40	2.26
63 50	2 34	59.9	2 34	37.2	2 34	14.5	2 33	51.8	2 33	29.2	2 33	6.5	5.48	2.27
64 0	2 35	55.4	2 35	32.6	2 35	9.7	2 34	46.9	2 34	24.1	2 34	1.2	5.55	2.28
64 10	2 36	51.6	2 36	28.6	2 36	5.7	2 35	42.7	2 35	19.7	2 34	56.8	+5.63	-2.30
64 20	2 37	48.6	2 37	25.5	2 37	2.4	2 36	39.3	2 36	16.1	2 35	53.0	5.70	2.31
64 30	2 38	46.3	2 38	23.1	2 37	59.8	2 37	36.6	2 37	13.3	2 36	50.1	5.78	2.32
64 40	2 39	44.9	2 39	21.5	2 38	58.1	2 38	34.7	2 38	11.3	2 37	47.9	5.86	2.34
64 50	2 40	44.2	2 40	20.7	2 39	57.1	2 39	33.6	2 39	10.1	2 38	46.5	5.94	2.35
65 0	2 41	44.4	2 41	20.7	2 40	57.0	2 40	33.3	2 40	9.6	2 39	45.9	+6.02	-2.37
65 10	2 42	45.4	2 42	21.5	2 41	57.7	2 41	33.9	2 41	10.0	2 40	46.2	6.10	2.38
65 20	2 43	47.2	2 43	23.2	2 42	59.3	2 42	35.3	2 42	11.3	2 41	47.3	6.19	2.40
65 30	2 44	50.0	2 44	25.8	2 44	1.7	2 43	37.6	2 43	13.4	2 42	49.3	6.28	2.41
65 40	2 45	53.6	2 45	29.3	2 45	5.0	2 44	40.7	2 44	16.4	2 43	52.1	6.37	2.43
65 50	2 46	58.1	2 46	33.7	2 46	9.2	2 45	44.8	2 45	20.3	2 44	55.9	+6.46	-2.44
66 0	2 48	3.0	2 47	39.0	2 47	14.4	2 46	49.8	2 46	25.1	2 46	0.5	6.56	2.46
66 10	2 49	10.0	2 48	45.2	2 48	20.5	2 47	55.7	2 47	30.9	2 47	6.1	6.65	2.48
66 20	2 50	17.4	2 49	52.4	2 49	27.5	2 49	2.6	2 48	37.6	2 48	12.7	6.75	2.49
66 30	2 51	25.7	2 51	0.6	2 50	35.5	2 50	10.4	2 49	45.3	2 49	20.2	6.85	2.51
66 40	2 52	35.1	2 52	9.8	2 51	44.6	2 51	19.3	2 50	54.0	2 50	28.7	+6.95	-2.53
66 50	2 53	45.5	2 53	20.1	2 52	54.6	2 52	29.2	2 52	3.7	2 51	38.3	7.05	2.54
67 0	2 54	57.0	2 54	31.4	2 54	5.7	2 53	40.1	2 53	14.5	2 52	48.9	7.16	2.56
67 10	2 56	9.5	2 55	43.7	2 55	17.9	2 54	52.1	2 54	26.3	2 54	0.5	7.27	2.58
67 20	2 57	23.2	2 56	57.2	2 56	31.2	2 56	5.2	2 55	39.3	2 55	13.3	7.38	2.60
67 30	2 58	37.9	2 58	11.8	2 57	45.6	2 57	19.4	2 56	53.3	2 56	27.1	+7.49	-2.62
67 40	2 59	53.8	2 59	27.5	2 59	1.2	2 58	34.8	2 58	8.5	2 57	42.1	7.60	2.63
67 50	3 1	10.9	3 0	44.4	3 0	17.9	2 59	51.3	2 59	24.8	2 58	58.3	7.72	2.65
68 0	3 2	29.2	3 2	2.5	3 1	35.8	3 1	9.0	3 0	42.3	3 0	15.6	7.84	2.67
68 10	3 3	48.8	3 3	21.8	3 2	54.9	3 2	28.0	3 2	1.1	3 1	34.2	7.97	2.69
68 20	3 5	9.6	3 4	42.4	3 4	15.3	3 3	48.2	3 3	21.1	3 2	54.0	+8.10	-2.71
68 30	3 6	31.6	3 6	4.3	3 5	37.0	3 5	9.7	3 4	42.3	3 4	15.0	8.23	2.73
68 40	3 7	55.0	3 7	27.5	3 7	0.0	3 6	32.4	3 6	4.9	3 5	37.4	8.36	2.75
68 50	3 9	19.8	3 8	52.0	3 8	24.3	3 7	56.6	3 7	28.8	3 7	1.1	8.49	2.77
69 0	3 10	45.9	3 10	17.9	3 9	50.0	3 9	22.1	3 8	54.1	3 8	26.2	8.63	2.79
69 10	3 12	13.4	3 11	45.3	3 11	17.1	3 10	49.0	3 10	20.8	3 9	52.6	+8.77	-2.82
69 20	3 13	42.4	3 13	14.0	3 12	45.7	3 12	17.3	3 11	48.9	3 11	20.5	8.92	2.84
69 30	3 15	12.9	3 14	44.3	3 14	15.7	3 13	47.1	3 13	18.5	3 12	49.9	9.06	2.86
69 40	3 16	44.9	3 16	16.0	3 15	47.2	3 15	18.4	3 14	49.6	3 14	20.8	9.22	2.88
69 50	3 18	18.4	3 17	49.4	3 17	20.3	3 16	51.3	3 16	22.2	3 15	53.2	9.38	2.90
70 0	3 19	53.6	3 19	24.3	3 18	55.0	3 18	25.7	3 17	56.4	3 17	27.2	+9.54	-2.93

FOR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION.

Azimuth at Elong.									Azimuth at Elong.		
*Time.		1° 0'	1° 10'	1° 20'	1° 30'	1° 40'	1° 50'	2° 0'	2° 10'	Time.*	
m		"	"	"	"	"	"	"	"	m	
0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
1		0.0	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1	
2		+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.3	0.3	0.3	2	
3		0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	3	
4		0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	4	
5		+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7	+ 1.9	5	
6		1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7	6	
7		1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	7	
8		2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	8	
9		2.8	3.2	3.7	4.2	4.6	5.1	5.6	6.0	9	
10		+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9	+ 7.4	10	
11		4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	11	
12		4.9	5.8	6.6	7.4	8.2	9.0	9.9	10.7	12	
13		5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13	
14		6.7	7.8	9.0	10.1	11.2	12.3	13.4	14.6	14	
15		+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4	+16.7	15	
16		8.8	10.2	11.7	13.2	14.6	16.1	17.5	19.0	16	
17		9.9	11.5	13.2	14.9	16.5	18.2	19.8	21.5	17	
18		11.1	12.9	14.8	16.7	18.5	20.4	22.2	24.1	18	
19		12.4	14.4	16.5	18.6	20.6	22.7	24.7	26.8	19	
20		+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4	+29.7	20	
21		15.1	17.6	20.1	22.7	25.2	27.7	30.2	32.7	21	
22		16.6	19.3	22.1	24.9	27.6	30.4	33.2	35.9	22	
23		18.1	21.1	24.2	27.2	30.2	33.2	36.2	39.3	23	
24		19.7	23.0	26.3	29.6	32.9	36.2	39.5	42.8	24	
25		+21.4	+25.0	+28.5	+32.1	+35.7	+39.2	+42.8	+46.4	25	

Azimuth at Elong.									Azimuth at Elong.		
*Time.		2° 10'	2° 20'	2° 30'	2° 40'	2° 50'	3° 0'	3° 10'	3° 20'	Time.*	
m	"	"	"	"	"	"	"	"	"	m	
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1	
2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	2	
3	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.0	3	
4	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.7	1.8	4	
5	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7	+ 2.9	+ 2.9	5	
6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.1	6	
7	3.7	3.9	4.2	4.5	4.8	5.0	5.3	5.6	5.6	7	
8	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	7.3	8	
9	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3	9.3	9	
10	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9	+11.4	+11.4	10	
11	9.0	9.7	10.4	11.1	11.8	12.4	13.1	13.8	13.8	11	
12	10.7	11.5	12.3	13.2	14.0	14.8	15.6	16.5	16.5	12	
13	12.6	13.5	14.5	15.4	16.4	17.4	18.4	19.3	19.3	13	
14	14.6	15.7	16.8	17.9	19.0	20.2	21.3	22.4	22.4	14	
15	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4	+25.7	+25.7	15	
16	19.0	20.5	21.9	23.4	24.9	26.3	27.8	29.3	29.3	16	
17	21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0	33.0	17	
18	24.1	25.9	27.8	29.6	31.5	33.3	35.2	37.0	37.0	18	
19	26.8	28.9	30.9	33.0	35.1	37.1	39.2	41.3	41.3	19	
20	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4	+45.7	+45.7	20	
21	32.7	35.3	37.8	40.3	42.8	45.3	47.9	50.4	50.4	21	
22	35.9	38.7	41.5	44.2	47.0	49.8	52.5	55.3	55.3	22	
23	39.3	42.3	45.3	48.3	51.4	54.4	57.4	60.4	60.4	23	
24	42.8	46.0	49.3	52.6	55.9	59.2	62.5	65.8	65.8	24	
25	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8	+71.4	+71.4	25	

\*Sidereal time from elongation.



FOR FINDING THE TIMES OF UPPER AND LOWER CULMINATION OF POLARIS, 1917, FROM THE OBSERVED TIMES WHEN THE STAR IS ON THE SAME VERTICAL CIRCLE WITH THE STARS ζ URSÆ MAJORIS (MIZAR) *SUB POLO* AND δ CASSIOPEIÆ *SUB POLO*, RESPECTIVELY.

Except at high latitudes, the pole star at either upper or lower culmination furnishes a simple and convenient method for laying down a meridian line on the earth's surface at points in the northern hemisphere. When the local time is unknown and accurate astronomical instruments are not available, the time of culmination of Polaris may be found by observing the instant when Polaris is vertically above (has the same azimuth as) ζ Ursæ Majoris (Mizar) below the pole, or δ Cassiopeise below the pole. In the former case, for the year 1917, Polaris is approaching upper culmination and in the latter case it is approaching lower culmination. The mean time interval which elapses between either of the observed times above mentioned and upper or lower culmination, as the case may be, is given for ζ Ursæ Majoris and δ Cassiopeise at ten-day intervals in the following table. This method can not be used at places south of 30° north latitude.

ζ URSÆ MAJORIS (MIZAR). (Upper culmination of Polaris.)						δ CASSIOPEIÆ. (Lower culmination of Polaris.)							
Date.	Lat.	40°	45°	50°	55°	60°	Date.	Lat.	35°	40°	45°	50°	55°
		m s	m s	m s	m s	m s			m s	m s	m s	m s	m s
Jan.	1	9 26	9 24	9 22	9 19	9 16	Jan.	1	10 33	10 35	10 36	10 39	10 42
	11	9 16	9 14	9 12	9 9	9 6		11	10 22	10 24	10 26	10 28	10 31
	21	9 5	9 3	9 1	8 59	8 55		21	10 12	10 14	10 15	10 18	10 20
	31	8 54	8 53	8 51	8 48	8 45		31	10 1	10 3	10 4	10 7	10 10
Feb.	10	8 44	8 43	8 41	8 38	8 35	Feb.	10	9 51	9 52	9 54	9 57	9 59
	20	8 35	8 34	8 32	8 29	8 26		20	9 42	9 43	9 45	9 47	9 50
Mar.	2	8 28	8 26	8 24	8 22	8 18	Mar.	2	9 34	9 35	9 37	9 39	9 42
								12	9 28	9 29	9 31	9 33	9 36
June	30	9 11	9 10	9 8	9 5	9 2		22	9 23	9 25	9 27	9 29	9 31
July	10	9 23	9 21	9 19	9 16	9 12	Apr.	1	9 21	9 22	9 24	9 26	9 29
	20	9 34	9 32	9 30	9 27	9 23		11	9 20	9 22	9 23	9 26	9 28
	30	9 44	9 43	9 40	9 38	9 34		21	9 22	9 24	9 25	9 28	9 30
Aug.	9	9 55	9 53	9 51	9 48	9 44	May	1	9 26	9 28	9 29	9 31	9 34
	19	10 5	10 3	10 1	9 58	9 54		11	9 32	9 33	9 34	9 37	9 40
	29	10 14	10 12	10 9	10 7	10 3		21	9 39	9 40	9 42	9 44	9 47
Sept.	8	10 22	10 20	10 17	10 14	10 10		31	9 47	9 49	9 50	9 53	9 56
	18	10 28	10 26	10 24	10 21	10 17	June	10	9 57	9 59	10 0	10 3	10 6
	28	10 33	10 31	10 29	10 26	10 22		20	10 8	10 9	10 11	10 13	10 16
Oct.	8	10 37	10 35	10 33	10 29	10 26		30	10 19	10 20	10 22	10 24	10 27
	18	10 39	10 37	10 35	10 31	10 28	July	10	10 30	10 32	10 33	10 36	10 39
	28	10 39	10 38	10 35	10 32	10 28		20	10 41	10 43	10 44	10 47	10 50
Nov.	7	10 38	10 36	10 34	10 31	10 27	July	30	10 52	10 54	10 56	10 59	11 2
	17	10 35	10 33	10 31	10 28	10 24							
	27	10 30	10 28	10 26	10 23	10 19	Nov.	27	11 39	11 41	11 43	11 46	11 49
Dec.	7	10 24	10 22	10 19	10 16	10 13	Dec.	7	11 32	11 34	11 36	11 39	11 42
	17	10 16	10 14	10 12	10 8	10 5		17	11 24	11 26	11 28	11 31	11 34
	27	10 7	10 5	10 3	10 0	9 56		27	11 15	11 17	11 18	11 21	11 24
	31	10 3	10 1	9 59	9 56	9 52		31	11 11	11 13	11 14	11 17	11 20

APPARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF POLARIS, 1917.

The local mean time of culmination on any meridian for a given date is found by taking from the following table the *Mean Time* of the nearest Greenwich culmination, and applying to it the product of the *Var. per Day* by the integral number of intervening days, this product being numerically additive for an earlier date and subtractive for a later date than that given in the table; and by applying also the product of the *Var. per Hour* by the longitude from Greenwich expressed in hours and fractions of an hour, this product being numerically additive for East longitudes and subtractive for West longitudes.

The time interval between upper and lower culmination is 12<sup>h</sup> diminished by one-half the numerical value of the *Var. per Day*.

The last column below applies to all meridians.

Date.	Upper Culmination, Meridian of Greenwich.					Latitude.	Mean Time Interval, Elongation minus Upper Culm.
	Apparent Right Ascension.	Apparent Declination.	Mean Time.	Var. per Day.	Var. per Hour.		
	h m s 1 29	° ' " +88 51	h m s	m s	W. E. s	°	W. h m E.
Jan. 1	89	70.6	6 47 7	-3 56.9	-9.87+	10	+5 58.2-
11	79	71.6	6 7 37	3 57.0	9.88	12	5 58.1
21	68	71.9	5 28 8	3 57.0	9.88	14	5 57.9
31	58	71.5	4 48 38	3 56.9	9.87	16	5 57.7
Feb. 10	48	70.5	4 9 9	3 56.9	9.87	18	5 57.6
20	39	69.0	3 29 41	-3 56.8	-9.87+	20	+5 57.4-
Mar. 2	31	66.9	2 50 14	3 56.6	9.86	22	5 57.2
12	25	64.3	2 10 49	3 56.5	9.85	24	5 57.0
22	20	61.5	1 31 25	3 56.3	9.84	26	5 56.8
Apr. 1	18	58.5	0 52 4	3 56.0	9.83	28	5 56.6
11	17	55.3	0 12 44	-3 55.8	-9.82+	30	+5 56.4-
20	19	52.2	23 33 27	3 55.6	9.82	32	5 56.2
30	23	49.3	22 54 11	3 55.4	9.81	34	5 56.0
May 10	28	46.7	22 14 58	3 55.3	9.80	36	5 55.7
20	35	44.4	21 35 46	3 55.1	9.80	38	5 55.5
30	44	42.5	20 56 35	-3 55.0	-9.79+	40	+5 55.2-
June 9	54	41.1	20 17 26	3 54.9	9.79	42	5 54.9
19	64	40.2	19 38 17	3 54.8	9.78	44	5 54.7
29	75	39.8	18 59 9	3 54.8	9.78	46	5 54.3
July 9	87	40.0	18 20 1	3 54.8	9.78	48	5 54.0
19	98	40.7	17 40 54	-3 54.8	-9.78+	50	+5 53.6-
29	109	42.0	17 1 46	3 54.8	9.78	52	5 53.2
Aug. 8	120	43.7	16 22 37	3 54.9	9.79	54	5 52.8
18	130	45.9	15 43 28	3 54.9	9.79	56	5 52.3
28	139	48.6	15 4 18	3 55.0	9.79	58	5 51.8
Sept. 7	147	51.6	14 25 7	-3 55.2	-9.80+	60	+5 51.2-
17	154	54.8	13 45 55	3 55.3	9.80	62	5 50.5
27	160	58.4	13 6 41	3 55.4	9.81	64	5 49.8
Oct. 7	164	62.0	12 27 26	3 55.6	9.82	66	5 48.9
17	166	65.8	11 48 9	3 55.8	9.82	68	5 47.8
27	167	69.6	11 8 51	-3 55.9	-9.83+	70	+5 46.6-
Nov. 6	165	73.3	10 29 31	3 56.1	9.84		
16	162	76.8	9 50 9	3 56.3	9.85		
26	158	80.1	9 10 45	3 56.4	9.85		
Dec. 6	152	83.0	8 31 20	3 56.6	9.86		
16	144	85.5	7 51 53	-3 56.8	-9.87+		
26	135	87.5	7 12 25	-3 56.9	-9.87+		



# ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

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There are in general use three different kinds of time, True Solar Time—also called Apparent Solar Time—Mean Solar Time, and Sidereal Time.

*True or Apparent Solar Time* is measured by the diurnal motion of the Sun, the length of the day being the interval between two successive transits of the Sun over the same meridian, and the time of day being the hour-angle of the Sun westward from the meridian. Owing to the obliquity of the ecliptic and to the lack of uniformity of the motion of the Earth in its orbit, the rate of motion of the Sun in hour-angle and the length of the apparent solar day are not constant. Therefore clocks and chronometers can not be regulated to apparent solar time, which may, however, be determined by observations of the Sun when visible.

*Mean Solar Time* is measured by the motion of a fictitious body called the mean Sun, which is supposed to move uniformly in the celestial equator, completing the circuit in one tropical year. Since mean solar time is uniform and regular in its passage, clocks and watches may be regulated to it, and those in ordinary use are usually so regulated.

Mean solar time can not, of course, be determined by direct observation, but may be determined indirectly by correcting observations of the Sun for the equation of time, or by converting to mean time sidereal time determined by observations of fixed stars.

*The Equation of Time* is the difference in hour-angle between the true Sun and the mean Sun. The true Sun is sometimes before and sometimes behind the mean Sun by an amount which varies from zero to about 16 minutes. The equation of time is given for Greenwich mean noon on pages 2–16 and for Washington apparent noon on pages 514–521.

*The Mean Solar Day* is the unit of mean solar time and is equal in length to the mean or average of all the true or apparent solar days of the year. It may be otherwise defined as the interval of time elapsing between two successive transits of the mean Sun across the meridian of any place.

*Sidereal Time* or star time, in general terms, is measured by the diurnal motion of the fixed stars, or, speaking more precisely, by the diurnal motion of that point on the celestial equator called the vernal equinox, from which the right ascensions of the heavenly bodies are measured. Astronomical clocks regulated to sidereal time are called sidereal clocks. Sidereal time may be determined from observations of stars whose right ascensions are known.

*A Sidereal Day* is very nearly the length of time in which the Earth rotates on its axis and is accurately defined as the time interval between two suc-

cessive transits of the vernal equinox over the same meridian. The sidereal day is shorter than the mean solar day by  $3^m 56^s.555$  sidereal time or  $3^m 55^s.909$  mean solar time, the tropical year of 365.2422 mean solar days containing 366.2422 sidereal days. Sidereal time and the length of the sidereal day are subject to slight irregularities on account of small differences between the positions of the true and mean equinoxes.

The mean solar and sidereal days are each divided into 24 hours. About March 23 (civil date) of each year, about two days after the vernal equinox, there is an instant when the face of a sidereal clock shows the same time as a mean time clock, and the former gains on the latter  $3^m 56^s.555$  sidereal time per mean solar day, so that at the end of a year it will have gained one sidereal day and will again agree with the mean time clock.

*The Civil Day* begins at midnight and comprises 24 hours, the hours being counted from 0 to 12 in two series; the first, marked A. M., running from midnight to noon, and the second, marked P. M., running from noon to midnight.

*The Astronomical Day* begins at noon on the civil day of the same date, the 24 hours being counted from 0 to 24, running from noon of one day to noon of the next following day. Astronomical time as well as civil time may be either apparent or mean.

The civil day begins twelve hours before the astronomical day; therefore the first half of the civil day coincides with the last half of the preceding astronomical day, and the last half of the civil day coincides with the first half of the astronomical day of the same date. Hence we have the following rules:

*To convert Civil Time into Astronomical Time.*—If the civil time is marked A. M., take one from the day and add twelve to the hours; if the civil time is marked P. M., take away the designation P. M. Thus, January 9, 2 o'clock, A. M., civil time, is January 8,  $14^h$ , astronomical time; and January 9, 2 o'clock, P. M., civil time, is January 9,  $2^h$ , astronomical time.

*To convert Astronomical Time into Civil Time.*—If the astronomical time is less than twelve hours, write P. M. after it; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

*To convert Solar or Sidereal Time of any meridian B to that of another meridian A,* add the difference of longitude expressed in time when A is east of B, and subtract the difference of longitude when A is west of B.

Greenwich mean time, which at any fixed observatory is obtained by applying the longitude to the local mean time, on board ship is usually taken from the mean time chronometer set to Greenwich time.

Greenwich mean noon of any date means the noon at the beginning of the astronomical day.

## PART I.—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Pages 2–17 contain for Greenwich mean noon of each day the *Sun's Apparent Right Ascension, Apparent Declination, Semidiameter, Horizontal Parallax, True Longitude, and Latitude*. They also contain the *Logarithm of the Radius Vector of the Earth, the Precession in Longitude, the Nutation in Longitude, the Aberration, the True Obliquity, the Equation of Time, the Sidereal Time or Right Ascension of Mean Sun, and the Mean Time of Sidereal Noon*. Adjoining columns contain, for each Greenwich mean noon, the *Variation per*

*Hour* for those of the quantities for which it seemed advisable to give a rate of motion. By multiplying any one of those variations by the hours and parts of an hour from Greenwich mean noon and adding the product algebraically to the corresponding quantity at noon, we obtain an approximate value of the quantity in question for any given Greenwich mean time. If great exactness is desired, the value of the hourly variation is found for the time halfway between Greenwich mean noon and the given Greenwich mean time before multiplying by the hours and parts of an hour from Greenwich mean noon.

It is to be noted that here, as elsewhere throughout the volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not corrected for aberration; it is referred to the true equinox.

The Sun's *Latitude* is referred to the ecliptic of the date.

The Sun's *Declination* is required whenever that body is observed for the purpose of finding latitude, local time, or azimuth.

The Sun's *Semidiameter* is used in reducing the altitude of the upper or lower limb of the Sun to the altitude of the center; and in reducing the angular distance between the limb of the Sun and any other object to the distance from the center of the Sun.

The *Horizontal Parallax* is the angle subtended by the equatorial radius of the Earth, as seen from the center of the Sun.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian fictitious year, i. e., the instant when the Sun's mean longitude is  $280^\circ$ , in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short-period terms being neglected.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short-period terms being neglected.

The corrections to the values of the nutation and the obliquity here given, to take account of the short-period terms, may be found on pages 215–216.

The *Equation of Time* is the apparent time of Greenwich mean noon, or the hour angle of the true Sun at that instant. When interpolated to any given Greenwich mean time, it is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of Mean Noon* is the right ascension of the mean Sun at Greenwich mean noon. It may be reduced for the longitude or to any Greenwich mean time by using the hourly variation,  $+9^s.8565$ ; or by Table III, page 693 of this volume, for reducing intervals of mean time to sidereal time. It is useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the right ascension of the mean Sun for that time.



and this being added to the local astronomical mean time, i. e., the hour angle of the mean Sun, will give the hour angle of the vernal equinox, or the sidereal time required.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past noon, and that is converted into the required mean time by subtracting from it the corresponding reduction of a sidereal interval to a mean-time interval, taken from Table II, page 690 of this volume. If the sidereal interval is less than  $3^m\ 56^s.555$ , there are two mean times corresponding to the given sidereal time, one a few minutes after the preceding noon, and the other a few minutes before the following noon, the mean time interval between these two mean times being  $23^h\ 56^m\ 4^s.09$ . The mean time, approximately known, will always show which one is to be taken. Instead of using Table II, the reduction of a sidereal to a mean time interval may be found by multiplying  $-9^s.8296$  by the hours and parts of an hour of the sidereal interval.

The *Mean Time of Sidereal Noon* is the number of hours, minutes, and seconds after Greenwich mean noon when the vernal equinox passes the meridian of Greenwich; it may be reduced to any other meridian by using the hourly variation,  $-9^s.8296$ , to effect the necessary interpolation, or the reduction may be taken directly from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent  $24^h -$  Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to mean time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the mean time of the *preceding* local sidereal noon, the mean time equivalent of the given sidereal time.

As examples of the use of pages 2-17:

1. Let the Sun's declination be required for 1917, April 14,  $2^h\ 5^m\ 20^s$ , P. M., at a place whose longitude is  $58^\circ\ 20'$ , or  $3^h\ 53^m\ 20^s$  west from Greenwich:

				<b>h</b>	<b>m</b>	<b>s</b>
Local mean time	.	.	.	April 14,	2	5 20
Longitude from Greenwich (additive)	.	.	.	.	3	53 20
Greenwich mean time	.	.	.	April 14,	5	58 40

Reducing the minutes and seconds to decimals of an hour, we find that this moment is  $5^h.978$  after Greenwich mean noon on April 14, or  $18^h.022$  before Greenwich mean noon on April 15.

On page 6 of the Ephemeris we find that the variation of declination per hour is:

						<b>"</b>
At Greenwich mean noon, April 14	.	.	.	.	.	+54.12
At Greenwich mean noon, April 15	.	.	.	.	.	+53.73
Difference for one day	.	.	.	.	.	- 0.39

If great exactness is desired, we find the amount of this hourly variation for the time halfway between Greenwich noon and the time of observation; that is, for 3 hours after Greenwich noon of the 14th, this being half of 6 hours. Three hours is 0.125 of a day; so the calculation is as follows:





The astronomical day is July 12; the longitude in time,  $+5^h\ 41^m\ 0^s$ , or  $+5^h.6833$ .

First solution.

Sidereal time at Greenwich mean noon, July 12 . . . . .	<div>h m s</div> <div>7 19 14.34</div>
Reduction for $5^h\ 41^m\ 0^s$ from Table III, or $9^s.8565 \times 5.6833$ . . . . .	<div>+56.02</div>
<hr/>	
The sidereal time at local mean noon, July 12 . . . . .	7 20 10.36
The given sidereal time ( $+24^h$ , if necessary for the following subtraction) . . . . .	29 27 17.77
<hr/>	
Subtracting the first from the second gives the sidereal interval from noon . . . . .	22 7 7.41 = $22^h.1187$
Reduction for $22^h\ 7^m\ 7^s.41$ from Table II, or $-9^s.8296 \times 22.1187$ . . . . .	<div>-3 37.42</div>
<hr/>	
The required astronomical mean time . . . . . July 12,	22 3 29.99

Second solution.

Mean time at Greenwich sidereal noon . . . . . July 12,	<div>h m s</div> <div>16 38 1.71</div>
Reduction for longitude from Table II, or $-9^s.8296 \times 5.6833$ . . . . .	<div>-55.86</div>
<hr/>	
Mean time of <i>preceding</i> local sidereal noon . . . . . July 12,	16 37 5.85
Add the given sidereal time . . . . .	5 27 17.77
Reduction for $5^h\ 27^m\ 17^s.77$ from Table II, or $-9^s.8296 \times 5.4549$ . . . . .	<div>-53.62</div>
<hr/>	
The required astronomical mean time . . . . . July 12,	22 3 30.00

If there is any doubt about the mean time of the *preceding* local sidereal noon, the first solution is to be preferred.

Pages 18–25 contain the rectangular coordinates of the Sun, referred to the center of the Earth as the origin, and to the true equator and equinox as the plane and point of reference. Each coordinate is given for every Greenwich mean noon and midnight. The columns *Reduc. to Mean Eq'x of 1917.0* give the corrections to be applied to the coordinates for noon in order to obtain the corresponding coordinates referred to the mean equator and equinox of the beginning of the Besselian fictitious year.

Pages 26–117 contain *The Moon's Right Ascension* and *Declination* for each day and hour of Greenwich mean time, referred to the true equator and equinox. They are accompanied by columns of *Variations per Minute*, by means of which, interpolation may be conveniently made to any moment of Greenwich mean time. The right ascension or declination is taken out for the given day and hour of Greenwich mean time; the *Var. per Min.* is multiplied by the minutes and parts of a minute of the Greenwich time, and the product is added numerically in case of the right ascension and algebraically in case of the declination.

Thus, suppose the Moon's right ascension and declination are required for 1917, January 25,  $10^h\ 10^m\ 30^s$ , astronomical mean time at Greenwich:

	Right Ascension.	Declination.
	<div>h m s</div>	<div>° ' "</div>
January 25, $10^h$ . . . . .	22 47 20.84	-3 11 30.1
Change in 10.5 minutes . . $2^s.2307 \times 10.5$ . . . . .	23.42 $+15''.944 \times 10.5$	+ 2 47.4
<hr/>		<hr/>
January 25, $10^h\ 10^m\ 30^s$ . . . . .	22 47 44.26	-3 8 42.7

For the sake of precision the differences here employed have been interpolated for  $5^m.2 = 0^h.09$ .

Page 117 contains also the *Phases of the Moon* and the dates of the *Moon's Apogee and Perigee*, or greatest and least distances from the Earth.

Pages 118–133 contain for every Greenwich mean noon and midnight the *Moon's Longitude* and *Latitude* referred to the true equinox and the ecliptic, its *Semidiameter*, and its *Equatorial Horizontal Parallax*. The column adjoining that of the horizontal parallax gives the variation of that quantity per hour, by means of which it can be reduced to any other Greenwich mean time in the manner shown in the preceding examples. When allowing for change in the variation itself, note must be taken of the fact that the tabular interval is here 12 hours instead of 24. The quantity thus obtained is the equatorial horizontal parallax; to obtain the horizontal parallax at any given place, the correction for the latitude of the place must be applied. The reduction of the Moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.2725 (see page xiii), or by simply computing the proportional part.

If, for example, the semidiameter of the Moon is to be taken out for 1917, March 10, 7<sup>h</sup>, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of March 10 is 3''.3; then,

$$12^h : 7^h = 3''.3 : 1''.9$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The Moon's semidiameter for March 10, 7<sup>h</sup>, is therefore 15' 4''.2.

The Moon's semidiameter and horizontal parallax are required for all observations of the Moon.

Pages 118–133 contain also: The *Moon's Age*, or the time elapsed since the preceding new Moon, given to tenths of a day; the mean time of the *Moon's Transit, Upper and Lower*, at Greenwich, given to tenths of a minute; and the *Variation per Hour* of the latter quantity, that is, the variation for one hour of longitude, by means of which the local time of an upper or lower transit of the Moon may be computed for any place whose longitude is known.

Pages 134–198 contain for each of the seven major planets the geocentric ephemeris followed immediately by the heliocentric ephemeris.

The geocentric ephemeris gives the planet's *Apparent Right Ascension* and *Apparent Declination* with the respective *Variations per Hour* or *per Day*. The positions thus given are referred to the true equator and equinox, and are corrected for aberration. The geocentric ephemeris gives also the *Logarithm of Distance from Earth* with the *Variation per Hour* or *per Day*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for Greenwich mean noon.

The right ascension and declination of a planet are required whenever it is observed for time, latitude, or azimuth. The mode of reducing the ephemeris positions of planets to other instants of Greenwich mean time is the same as that already given for the Sun. The local mean time of meridian transit of any planet at any place can be found by dividing the proper daily difference of the ephemeris times by 24, multiplying the quotient by the longitude of the place expressed in hours and fractions, and applying the product with its proper sign to the time of Greenwich transit.

The heliocentric ephemeris gives the *Heliocentric Longitude*, *Mean Equinox of Date*; the *Heliocentric Latitude*; and the *Logarithm of Radius Vector*; with

their respective *Variations per Day*. The heliocentric longitude may be referred to the true equinox by applying nutation. The variations are given for the instant of Greenwich mean noon. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of the date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun.

PART II.—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Pages 200–201 contain formulæ for reducing mean positions of stars to apparent positions, including expressions for the Besselian star-numbers and star-constants, and for the independent star-numbers; the whole based upon the constants of the Paris Conference of May, 1896, and expressed in the notation of BESSEL.

Pages 202–205 contain the logarithms of the *Besselian Star-Numbers*, *A*, *B*, *C*, *D*, for each Washington mean midnight, with the values of *E* appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at any of the dates for which the numbers are given, and in ordinary cases four-figure logarithms suffice; but where extreme accuracy is desired the logarithms of *A*, *C*, and *D* are sometimes needed to five places of decimals. Along with the solar day, the first column contains the sidereal hour of Washington mean midnight for certain dates, and by interpolation among them it is easy to find the sidereal time for which any set of quantities is given.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:

Computation of the apparent place of  $\alpha$  Aquilæ, July 2, 1917, for the upper transit at Washington.

log <i>a</i>	0.5165	log <i>b</i>	7.2446 <i>n</i>	log <i>c</i>	8.0440	log <i>d</i>	8.8235 <i>n</i>
log <i>A</i>	9.9260	log <i>B</i>	0.0766 <i>n</i>	log <i>C</i>	0.5420	log <i>D</i>	1.3035 <i>n</i>
log <i>a'</i>	0.5166	log <i>b'</i>	9.9941	log <i>c'</i>	9.4341	log <i>d'</i>	8.4152 <i>n</i>
log <i>Aa</i>	0.4425	log <i>Bb</i>	7.3212	log <i>Cc</i>	8.5860	log <i>Dd</i>	0.1270
log <i>Aa'</i>	0.4426	log <i>Bb'</i>	0.0707 <i>n</i>	log <i>Cc'</i>	9.9761	log <i>Dd'</i>	9.7187
Mean Place, 1917.0				$\alpha_0 =$	<sup>h</sup> 18 <sup>m</sup> 37 <sup>s</sup> 43.817	$\delta_0 =$	<sup>°</sup> -9 <sup>'</sup> 7 <sup>"</sup> 58.66
				<i>Aa</i> =	+2.770	<i>Aa'</i> =	+2.77
				<i>Bb</i> =	+0.002	<i>Bb'</i> =	-1.18
				<i>Cc</i> =	+0.039	<i>Cc'</i> =	+0.95
				<i>Dd</i> =	+1.340	<i>Dd'</i> =	+0.52
				<i>E</i> =	+0.003	$\tau\mu' =$	0.00
				$\tau\mu =$	+0.001		
Apparent Place, July 2,				$\alpha =$	<u>18 37 47.972</u>	$\delta =$	<u>-9 7 55.60</u>

Pages 206–213 contain the *Independent Star-Numbers*, which can frequently be advantageously used instead of the *Besselian Star-Numbers*. The terms of short period have been included. These quantities are connected with those of Bessel by the relations given on page 200, which also contains the formulæ and precepts for the application of both systems of numbers. In order to use

the Besselian numbers, it is necessary to have the values of the star-constants,  $a, b, c, d, a', b', c', d'$ , while the independent star-numbers render it possible to determine the apparent place of a star without computing these star-constants. Four-figure logarithms usually suffice, but where extreme accuracy is desired the logarithms of  $g$  and  $h$  are needed to five places of decimals, and  $G$  and  $H$  are needed to one-tenth of a minute of arc. The column  $\tau$  gives the fraction of a year, counted from the beginning of the Besselian fictitious year to each date.

The following is an example of the reduction of a star to apparent place by the independent star-numbers:

*Computation of the apparent place of  $\epsilon$  Aquilæ, July 2, 1917, for the upper transit at Washington.*

	$G=23^{\text{h}} 43.9^{\text{m}}$		$\delta_0 = -9^{\circ} 8.0'$	
	$\alpha_0 = 18^{\text{h}} 37.7^{\text{m}}$		$G + \alpha_0 = 18^{\text{h}} 21^{\text{m}}.6$	
	$H = 11^{\text{h}} 20.7^{\text{m}}$		$H + \alpha_0 = 5^{\text{h}} 58.4^{\text{m}}$	
$\log \frac{1}{r}$	8.8239	$\log \frac{1}{r}$	8.8239	$\alpha_0 = 18^{\text{h}} 37^{\text{m}} 43.817^{\text{s}}$
$\log g$	1.2291	$\log h$	1.3099	$f + f' = +2.594$
$\sin (G + \alpha_0)$	9.9981 <i>n</i>	$\sin (H + \alpha_0)$	0.0000	$(g) = +0.181$
$\tan \delta_0$	9.2062 <i>n</i>	$\sec \delta_0$	0.0055	$(h) = +1.378$
				$\tau\mu = +0.001$
$\log (g)$	9.2573	$\log (h)$	0.1393	$\alpha = 18^{\text{h}} 37^{\text{m}} 47.971^{\text{s}}$
				$\delta_0 = -9^{\circ} 7' 58.66''$
$\log g$	1.2291	$\log h$	1.3099	$(g') = +1.59$
$\cos (G + \alpha_0)$	8.9736	$\cos (H + \alpha_0)$	7.8439	$(h') = -0.02$
		$\sin \delta_0$	9.2007 <i>n</i>	$(i) = +1.49$
$\log (g')$	0.2027			$\tau\mu' = 0.00$
		$\log (h')$	8.3545 <i>n</i>	$\delta = -9^{\circ} 7' 55.60''$
$\log i$	0.1793			
$\cos \delta_0$	9.9945			
$\log (i)$	0.1738			

Page 214 contains for every tenth sidereal day the *Besselian and Independent Star-Numbers*, exclusive of all short-period terms. They are useful in computing ephemerides of stars, similar to those on pages 316–513, for which data containing short-period terms should not be employed.

Pages 215–216 contain for Washington mean midnight of each day the short-period terms of the nutation in longitude and obliquity, for use in connection with the formulæ on page 201, and the coefficients mentioned later, which are given for each star on pages 316–513.

Pages 217–230 contain the *Mean Places of Ten-day Stars* for the beginning of the Besselian fictitious year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the beginning of the year.

Page 231 contains, for the *Circumpolar Stars*, the same data as the immediately preceding pages do for the ten-day stars.

Pages 232–315 contain for every upper transit at Washington the apparent positions of seventeen northern and eighteen southern circumpolar stars arranged in the order of their right ascensions. The mean solar time of transit is given in the column *Washington Mean Time*, in order that each transit above

and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26 is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 232 we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But the lower transit of July 1 precedes the upper one, which occurs July 1.8. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column *Washington Mean Time*.

The secant and tangent of the apparent declination for the 15th of each month and the mean place in right ascension and declination for the beginning of the year are given for each star at the foot of the page.

Pages 316–513 contain, for every tenth upper transit at Washington, the apparent places of 790 stars, being all those given in the list of mean places of ten-day stars. The *Washington Mean Time* in the left-hand column of each page gives the day and tenth of the transit, so that intermediate transits may be readily identified; and to facilitate interpolation, the differences of each coordinate are given for every ten days.

In connection with the ephemeris of each ten-day star there are given at the foot of the page, (1) the seconds of the mean place in both right ascension and declination for the beginning of the year, (2) the secant and the tangent of the mean of the star's greatest and least apparent declinations during the year, and (3) the coefficients of the short-period terms of the nutation, the use of which is explained on page 201.

Pages 514–521 contain, for Washington apparent noon, the *Apparent Right Ascension* and *Declination* of the Sun, the *Equation of Time*, and the *Variation per Hour* of these quantities; the *Semidiameter* of the Sun, and the *Sidereal Time of Semidiameter Passing Meridian*. The last column on each page contains the *Sidereal Time of Mean Noon*.

The *Equation of Time, Mean–App.* is the correction to be applied to apparent time in order to obtain mean time. Each number as given is the mean time of transit of the Sun's center over the meridian of Washington counted from the nearest noon.

Pages 522–537 contain the *Right Ascension of Center*, the *Geocentric Declination of Center*, the *Sidereal Time of Semidiameter Passing Meridian*, the *Geocentric Semidiameter*, and the *Equatorial Horizontal Parallax* of the Moon, and the *Washington Mean Time* at the moment of each upper and lower transit over the meridian of Washington.

The *Variation per Hour of Longitude* is the correction to be applied in each case to the quantity in the preceding column to obtain its value for the time of transit over the meridian one hour west of Washington, supposing the rate of change to be uniform and equal to what it is at the instant of transit over the meridian of Washington. The quantities in the third column, when corrected for another longitude by the hourly variations, give the local mean time of transit for that longitude. By means of the variations per hour of longitude any one of the quantities under consideration can be computed with great exactness for the moment of transit over any meridian not more than one hour distant from Washington. To obtain the same accuracy for more distant



meridians, we may proceed as follows: Let  $F$  represent either the *Washington Mean Time*, the *Right Ascension of Center*, or the *Geocentric Declination of Center*, and let  $V$  represent the corresponding *Variation per Hour of Longitude*. Write down three successive values of  $F$ , together with the corresponding values of  $V$ , and difference the latter as in the following scheme, where the middle values,  $F_0$  and  $V_0$ , belong to the culmination from which is to be derived the value of  $F$  for the culmination on the meridian whose longitude is  $\lambda$ :—

Function.	Var. per Hour of Longitude.	$\Delta'$	$\Delta''$
$F_{-1}$	$V_{-1}$	$a'$	$b$
$F_0$	$V_0$	$a''$	
$F_{+1}$	$V_{+1}$		

Then, for the culmination at the meridian  $\lambda$

$$F_\lambda = F_0 + \lambda V_0 + \frac{\lambda^2}{48} (a' + a'') + \frac{\lambda^3 b}{864}$$

where  $\lambda$  must be expressed in hours and decimals of an hour, and reckoned from Washington or from  $180^\circ$  from Washington according as the upper or lower culmination is used for the middle value ( $F_0$ ). Adding twelve hours to the Washington time of lower transit at Washington gives the local time of upper transit at places whose longitude is  $180^\circ$  from Washington.

The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When one limb is full and the terminator is within  $1''$  of the opposite limb, both can be well observed, and in such cases both are indicated, the defective limb being indicated by an italic letter or numeral, and the correction for defective illumination (as seen from Washington) being given in a footnote.

Pages 538–554 contain for each of the seven major planets, the geocentric *Apparent Right Ascension* and *Declination*, the *Horizontal Parallax*, *Semidiameter*, *Sidereal Time of Semidiameter Passing Meridian*, and the *Washington Mean Time*, for the moments of all transits which it is usually desirable to observe over the meridian of Washington. The stellar magnitude at opposition for Mars, Jupiter, Saturn, Uranus, and Neptune, respectively, is given at the bottom of the page containing the ephemeris of the planet.

### PART III.—PHENOMENA.

This part gives the dates of the principal astronomical phenomena of the year, expressed in Greenwich mean time, except in the case of the occultations visible at Washington, where Washington time is used.

Pages 556–563 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The eclipse elements are given for the moment of conjunction of the Sun and Moon in right ascension, but the subsequent tables and results are computed from the exact positions of these bodies at the several instants referred to. The times and angles designated as the circumstances of a lunar eclipse remain the same throughout all parts of the Earth, and require no explanation beyond a mere statement of the fact that in computing them the geometrical

diameter of the Earth's shadow has been augmented in the proportion of 51 : 50. The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:—

The line entitled "Eclipse begins" gives the Greenwich mean time at which the Moon's penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse begins" gives the time when the axis of the Moon's shadow first touches the Earth, and the latitude and longitude of the point of contact follow.

The line entitled "Central eclipse at local apparent noon" gives the time when the axes of the Earth and of the shadow cone lie in the same plane. The latitude and longitude of the point where the axis of the shadow cone then cuts the Earth's surface follow, and there the eclipse will be central and the Sun will be exactly on the meridian.

The lines entitled "Central eclipse ends" and "Eclipse ends" give, respectively, the times when and the localities where these events occur, the phenomena being the converse of those denoted by the similar phrases for the beginning.

In the case of partial solar eclipses the axis of the Moon's shadow does not come into contact with the Earth, and the three lines entitled, respectively, "Central eclipse begins," "Central eclipse at local apparent noon," and "Central eclipse ends," are replaced by a single line entitled "Greatest eclipse," whereon are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

*Maps of the Eclipses.*—The regions in which each eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour of Greenwich mean time, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between the corresponding hours of Greenwich mean time; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. This division may be made a little more exact by allowing for the changes in the spaces as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of 1917, January 22, begins and ends at Kasan, Russia, latitude  $+55^{\circ} 50'$ , longitude  $-48^{\circ} 49'$ .

For the beginning we compare the distance of the place from the curves of  $18^h$  and  $19^h$ , and find it to correspond to about 40 minutes from the former, thus giving for the approximate time of beginning  $18^h 40^m$ ; for the end we compare the distance of the place from the curves of  $20^h$  and  $21^h$ , and find it to be about 50 minutes from the former, thus giving for the approximate time of ending  $20^h 50^m$ , and both of these results are probably correct to within 3 or 4 minutes.

Changing to local mean time, we shall have—

					<i>Beginning.</i>			<i>Ending.</i>		
					d	h	m	d	h	m
Greenwich mean time	.	.	.	January	22	18	40	22	20	50
Longitude east	.	.	.	.		3	15		3	15
Local mean time	.	.	.	January	22	21	55	23	0	5

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit; the measurements being made upon a line drawn through the place perpendicularly to the central line.

*More Accurate Computations.*—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements which are given for every 10 minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the center of the Earth, perpendicular to the right line joining the centers of the Sun and Moon. This latter line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of  $xy$ . We take the intersection of this plane with that of the Earth's equator as the axis of  $x$ , and the center of the Earth as the origin of coordinates. The axis of  $y$  is perpendicular to that of  $x$ , and directed toward the north;  $x$  and  $y$  are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as unity. The angle  $d$ , of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; or, in other words, it is the declination of the center of the Sun as seen from the center of the Moon. The angle  $\mu$  is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities  $l_1$  and  $l_2$  are the radii of the shadow cones upon the fundamental plane,  $l_1$  corresponding to the penumbra, and  $l_2$  to the umbra, or annulus. The notation is that of CHAUVENET's *Spherical and Practical Astronomy*, in which  $l_2$  is regarded as positive for an annular and negative for a total eclipse.

The angles  $f_1$  and  $f_2$ , the tangents of which are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semiangles of the two cones.

In order to facilitate interpolation to any required moment, the logarithms of  $x'$ ,  $y'$ , and  $\mu'$ , which are the changes of  $x$ ,  $y$ , and  $\mu$ , in one minute of time, are given at the bottom of the table.

The method of computing an eclipse from its Besselian elements is based on the fact that at the moments of beginning and ending the distance of the observer from the axis of the shadow or penumbra is equal to the radius of the latter at the point of observation. To find this distance and radius we proceed as follows:

(1) The coordinates of the observer,  $\xi$ ,  $\eta$ , and  $\zeta$ , together with their variations in one minute, are computed for some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase.



(2) The coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations in one minute, are taken for the same moment from the tables of elements.

(3) From (1) and (2) the position and motion of the observer relative to the axis of the shadow are found.

(4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer is also computed.

(5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follows:—

(1) Find  $\rho \cos \varphi'$  and  $\rho \sin \varphi'$ , which are the geocentric coordinates of the station referred to the Earth's equator,  $\rho$  being the distance from the center of the Earth and  $\varphi'$  the geocentric latitude. These coordinates may be computed from the following table based on the compression of the Earth adopted at the Paris Conference of 1911,  $1/297$ , by the formulæ—

$$\begin{aligned}\rho \cos \varphi' &= F \cos \varphi \\ \rho \sin \varphi' &= \frac{\sin \varphi}{G}\end{aligned}$$

$\varphi$  being, as usual, the geographic latitude.

Table for Computing the Geocentric Coordinates of a Place.

$\varphi$	Log $F$ .		Log $G$ .	
0°	0.00000	1	0.00293	1
5	0.00001	3	0.00292	3
10	0.00004	6	0.00289	6
15	0.00010	7	0.00283	7
20	0.00017	9	0.00276	9
25	0.00026	11	0.00267	11
30	0.00037	11	0.00256	11
35	0.00048	12	0.00245	12
40	0.00060	12	0.00232	12
45	0.00073	12	0.00220	12
50	0.00086	12	0.00207	12
55	0.00098	12	0.00195	12
60	0.00110	10	0.00183	10
65	0.00120	9	0.00172	9
70	0.00129	8	0.00164	8
75	0.00137	5	0.00156	5
80	0.00142	3	0.00151	3
85	0.00145	1	0.00148	2
90	0.00146		0.00146	

For the assumed Greenwich mean time of computation, take from the table of elements the values of  $\sin d$ ,  $\cos d$ , and  $\mu$ . Then, with  $\lambda$  for the longitude west from Greenwich, the coordinates of the observer will be—

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (\mu - \lambda) \\ \eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda) = \eta_1 - \eta_2 \\ \zeta &= \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda) = \zeta_1 + \zeta_2\end{aligned}$$

and their variations in one minute of mean time will be—

$$\begin{aligned}\xi' &= [7.63992] \rho \cos \varphi' \cos (\mu - \lambda) \\ \eta' &= [7.63992] \rho \cos \varphi' \sin d \sin (\mu - \lambda) = [7.63992] \xi \sin d \\ \zeta' &\text{ is not needed.}\end{aligned}$$

(2) For the same assumed moment of Greenwich mean time, take from the tables of elements the coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. These variations are represented by  $x'$  and  $y'$ , and their logarithms are given beneath the tables of  $x$  and  $y$ .

(3) The distance  $m$  and position-angle  $M$  of the axis of the shadow relative to the observer, and the relative motions,  $n$  and  $N$ , are computed by the formulæ—

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta'\end{aligned}$$

(4) Both for the shadow and for the penumbra, the radius  $L$  at the distance  $\zeta$  from the fundamental plane is computed by the formulæ—

$$L = l - \zeta \tan f$$

$l$  and  $f$  being taken from the table of elements, and  $\zeta$  computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or ending of the eclipse, we shall have—

$$m = L.$$

But, as this condition will rarely be fulfilled on a first trial, a correction  $\tau$  to the assumed time is computed thus: Find the angle  $\psi$  from the equation—

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values for this angle, of which one will be in the first and the other in the second quadrant when  $\sin \psi$  is positive, and one in the third and the other in the fourth quadrant when  $\sin \psi$  is negative; but simplicity will be gained by taking only that value of  $\psi$  for which  $\cos \psi$  is positive. This value lies between the limits  $+90^\circ$  and  $-90^\circ$ . The correction  $\tau$  to the assumed time of beginning or ending of the eclipse will then be found, in minutes, from—

$$\tau = -\frac{m \cos (M - N)}{n} \mp \frac{L \cos \psi}{n}$$

where the double sign is to be taken negative for the beginning and positive for the ending.

However, one such pair of values of  $\tau$  can not give the times of both beginning and ending with accuracy. To attain that, we must commence the computation by assuming two times, one near the beginning and the other near the ending of the eclipse, both of which may be derived from the chart with sufficient exactness. The computation for the first assumed time will give a small value of  $\tau$  which, when applied to the assumed time, will give

the beginning of the eclipse nearly correctly, and a large value which will give an inaccurate time of ending. Similarly, the computation for the second assumed time will give a small and nearly correct value of  $\tau$  for finding the time of ending, and a large and inaccurate negative value for finding the time of beginning. We shall thus deduce two times of each phase, only one of which is to be regarded as approximately correct.

The more accurate times of beginning and ending may now be taken in place of those originally assumed, and the whole computation may be repeated, thus leading to a pair of values of  $\tau$ , which should be very small and accurate. Such a repetition of the computation will in general be advisable, to guard against accidental numerical errors, but a second approximation may be obtained without it, by finding a corrected value of  $\tau$  in accordance with the formulæ—

$$\delta\tau = \mp \frac{\tau(l' + [5.3100]\xi \cos d)}{n \cos \psi} - \frac{[4.9788]\tau^2}{n \cos \psi} [\xi \sin (N \mp \psi) - \eta_2 \cos (N \mp \psi)]$$

$$\tau_0 = \tau + \delta\tau$$

where the double signs are to be taken negative for the beginning of the eclipse and positive for the ending.  $l'$  is the variation of  $l$  for one minute of time, and its numerical value can be taken by inspection from the table of Besselian elements.

If the resulting values of  $\tau_0$  are not greater than fifteen minutes, the corrected times of contact thus obtained will be theoretically exact within less than a second, but the uncertainties of the solar and lunar tables are such that an unavoidable error of several seconds may exist in the prediction. To guard against numerical mistakes it is better, after making this final correction, to repeat the computations so far as to obtain new values of  $m$  and  $L$  for the corrected times. If these two quantities agree within a unit of the fourth place of decimals, the times employed are generally correct within a second of time. If they differ too widely, the computer must use his own judgment as to making further corrections and computations.

*Position-angle of Point of Contact.*—The position-angle  $P$ , of the point of contact, reckoned from the north point of the Sun's limb toward the east, is found by the formulæ—

$$P = N - \psi \pm 180^\circ \text{ for the beginning,}$$

$$\text{or } P = N + \psi \quad \text{for the ending,}$$

it being assumed that, in each case, the value of  $\psi$  is taken between the limits  $\pm 90^\circ$ .

*Computation of the Solar Eclipse of 1917, January 22, for Kasan, Russia.*

The position of Kasan is—

$$\begin{array}{rcl} \text{Latitude, } \varphi & = & +55^\circ 50' 20'' \\ \text{Longitude, } \lambda & = & -48^\circ 49' 8'' \end{array}$$

and its geocentric coordinates are—

$$\begin{array}{l} \rho \sin \varphi' = 9.91582 \\ \rho \cos \varphi' = 9.75037 \end{array}$$

From the Eclipse Chart we find the approximate times of the phases to

3—

Beginning	January	d	h	m	} Greenwich Mean Time.
Ending		22	18	40	
		22	20	50	
	<i>T</i>	Jan. 22,	Beginning.	Ending.	
			18 <sup>h</sup> 40 <sup>m</sup>	20 <sup>h</sup> 50 <sup>m</sup>	
			° ' "	° ' "	
	$\mu$		277 1 42	309 31 30	
	$\lambda$		- 48 49 8	- 48 49 8	
	$\mu - \lambda$		+325 50 50	+358 20 38	
	$\rho \cos \varphi'$		9.75037	9.75037	
	$\sin (\mu - \lambda)$		9.74927 <i>n</i>	8.46091 <i>n</i>	
	$\log \xi$		9.49964 <i>n</i>	8.21128 <i>n</i>	
	$\xi$		-0.31597	-0.01627	
	$\rho \sin \varphi'$		9.91582	9.91582	
	$\cos d$		9.97417	9.97423	
	$\log \eta_1$		9.88999	9.89005	
	$\eta_1$		+0.77623	+0.77633	
	$\rho \cos \varphi'$		9.75037	9.75037	
	$\sin d$		9.52487 <i>n</i>	9.52445 <i>n</i>	
	$\cos (\mu - \lambda)$		9.91780	9.99982	
	$\log \eta_2$		9.19304 <i>n</i>	9.27464 <i>n</i>	
	$\eta_2$		-0.15597	-0.18821	
	$\eta = \eta_1 - \eta_2$		+0.93220	+0.96454	
	$\rho \sin \varphi' \sin d$		9.44069 <i>n</i>	9.44027 <i>n</i>	
	$\zeta_1$		-0.27586	-0.27559	
	$\rho \cos \varphi' \cos d \cos (\mu - \lambda)$		9.64234	9.72442	
	$\zeta_2$		+0.43887	+0.53018	
	$\zeta = \zeta_1 + \zeta_2$		+0.16301	+0.25459	
	const. log.		7.63992	7.63992	
	$\rho \cos \varphi' \cos (\mu - \lambda)$		9.66817	9.75019	
	$\log \xi'$		7.30809	7.39011	
	$\xi'$		+0.002033	+0.002455	
	const. log.		7.63992	7.63992	
	$\xi \sin d$		9.02451	7.73573	
	$\log \eta'$		6.66443	5.37565	
	$\eta'$		+0.000462	+0.000024	
	$x - \xi$		-0.49777	+0.39785	
	$y - \eta$		+0.00719	+0.38000	
	$x' - \xi'$		+0.007163	+0.006739	
	$y' - \eta'$		+0.002652	+0.003095	
	$m \sin M$		9.69703 <i>n</i>	9.59972	
	$m \cos M$		7.85673	9.57978	
	$\tan M$		1.84030 <i>n</i>	0.01994	
	$M$		270° 49' 39''	46° 18' 54''	
	$\sin M$		9.99995 <i>n</i>	9.85923	
	$\log m$		9.69708	9.74049	
	$n \sin N$		7.85509	7.82860	
	$n \cos N$		7.42357	7.49066	
	$\tan N$		0.43152	0.33794	

	Beginning. 69° 41' 2''	Ending. 65° 19' 56''
$N$		
$\sin N$	9.97210	9.95844
$\log n$	7.88299	7.87016
$\tan f$	7.67665	7.67664
$\log \zeta$	9.21222	9.40584
	6.88887	7.08248
$\zeta \tan f$	+0.00077	+0.00121
$l$	+0.53797	+0.53792
$L$	+0.53720	+0.53671
$M-N$	201° 8' 37''	340° 58' 58''
$\sin (M-N)$	9.55715 $n$	9.51302 $n$
$\log m$	9.69708	9.74049
$\operatorname{colog} L$	0.26986	0.27026
$\sin \psi$	9.52409 $n$	9.52378 $n$
$\psi$	-19° 31' 40''	-19° 30' 48''
$\log \frac{m}{n}$	1.81409	1.87033
$\cos (M-N)$	9.96973 $n$	9.97563
	1.78382 $n$	1.84596
$-\frac{m}{n} \cos (M-N)$	+60.789	-70.139
$\log L$	9.73014	9.72974
$\cos \psi$	9.97427	9.97431
$\operatorname{colog} n$	2.11701	2.12984
	1.82142	1.83389
$\mp \frac{L \cos \psi}{n}$	-66.286	+68.217
$\tau$	$\begin{matrix} m \\ -5.497 \end{matrix}$	$\begin{matrix} m \\ -1.922 \end{matrix}$
$T+\tau$	$\begin{matrix} d & h & m \\ 22 & 18 & 34.503 \end{matrix}$	$\begin{matrix} d & h & m \\ 22 & 20 & 48.078 \end{matrix}$

Since the value of  $\tau$  for the beginning is rather large, we compute the correction  $\delta\tau$  for this phase as follows:

	Beginning.		Beginning.
const. log	5.3100	$\cos (N-\psi)$	8.1358
$\log \xi$	9.4996 $n$	$\log \eta_2$	9.1930 $n$
$\cos d$	9.9742	$\log \eta_2 \cos (N-\psi)$	7.3288 $n$
	4.7838 $n$	$\xi \sin (N-\psi)$	-0.3160
number	-0.0000061	$\eta_2 \cos (N-\psi)$	-0.0021
$l'$	0.0000000	diff.	-0.3139
sum	-0.0000061	$\log (\text{diff.})$	9.4968 $n$
$\log (\text{sum})$	4.7838 $n$	const. log	4.9788 $n$
$\log (-\tau)$	0.7401	$\log \tau^2$	1.4802
$\operatorname{colog} n$	2.1170	$\operatorname{colog} (n \cos \psi)$	2.1427
$\sec \psi$	0.0257		8.0985
	7.6666 $n$	(2)	+0.0125
(1)	-0.0046	$\begin{matrix} m \\ (1)+(2)=\delta\tau \end{matrix}$	+0.0079
$N-\psi$	89° 13'	$\tau$	-5.497
$\sin (N-\psi)$	0.0000	$\tau_0$	-5.489
$\log \xi$	9.4996 $n$		
$\log \xi \sin (N-\psi)$	9.4996 $n$		

The corrected time of beginning is, therefore,

$T_0$  = January 22<sup>d</sup> 18<sup>h</sup> 34<sup>m</sup>.511

Whence we find—

	Beginning.			Ending.		
	d	h	m	d	h	m
Greenwich Mean Time, January	22	18	34.511	22	20	48.078
$\lambda$	—	3	15.276	—	3	15.276
Local Mean Time, January	22	21	49.787	23	0	3.354

Therefore we have—

Beginning of the Eclipse, January	d	h	m	s	} Local Mean Time.
End of the Eclipse, January	22	21	49	47.2	
	23	0	3	21.2	

	Beginning.		Ending.	
	d	m	d	m
$N \mp \phi$	89	12.7	45	49.1
constant	180	0.0	0	0.0
Angle of position, $P$	269	12.7	45	49.1

from the north point of the Sun's disk toward the east for direct image.

Pages 564–568 contain the adopted mean places and annual proper motions of such stars, as bright as magnitude 6.5, as will be occulted during the year by the Moon.

Pages 569–610 contain the elements for the prediction of the times of occultations of stars and planets by the Moon during the current year. The system of coordinates employed is similar to that already described for eclipses, the fundamental plane passing through the center of the Earth, and being taken perpendicular to the line joining the star and the center of the Moon, but the cone circumscribing the Moon and star is regarded as a cylinder which intercepts the fundamental plane in a circle having the same linear diameter as the Moon.

In the columns referring to the star, those headed *Red'ns from 1917.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1917 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

Under the general head, *At Conjunction in R. A.*, are five columns giving certain quantities for the moment of geocentric conjunction of the Moon and star in right ascension, as follows:

The *Greenwich Mean Time* is the moment,  $T$ , at which the two bodies are in geocentric conjunction in right ascension. At that moment the coordinate  $x$  of the axis of the cylinder on the fundamental plane has the value zero. The column *Hour Angle,  $H$* , gives the common geocentric hour-angle of the Moon and star at the same moment, expressed in sidereal time and counted from the meridian of Greenwich—positive toward the west and negative toward the east. Column  $Y$  gives the coordinate  $y$  of the axis of the cylinder upon the fundamental plane at the same moment. Columns  $x'$  and  $y'$  give the variations of  $x$  and  $y$  in one hour of mean time. The linear unit in these columns is the Earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the time of immersion and emersion of a star relative to the limb of the Moon may be computed for any part of the Earth by a method nearly the same as that already explained for computing eclipses, but somewhat more simple.

*Prediction of Occultations for a given Place.*—When it is desired to predict the circumstances of one or more occultations at any place, the first step will be to select them from the general list given in the Ephemeris. The conditions of visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.

2. The quantity  $H - \lambda$ , taken without regard to sign, must be less than the semidiurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east, or an immersion in the west, when this difference is a few minutes less than an hour.

3. The Sun must not be much more than an hour above the horizon at the local mean time  $T - \lambda$ , unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course will be to write the value of  $-\lambda$  on the bottom of a slip of paper, and in passing through the list of occultations to pause over each one for which condition (1) is fulfilled, and examine by means of the slip whether conditions (2) and (3) are also fulfilled. If either fails, the computer passes on. Sometimes it will be difficult to determine whether  $H - \lambda$  or  $T - \lambda$  falls within the limits; and in such cases the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

The next step will be to compute the local times of immersion and emersion from the elements, and to that end let—

$T$  = the instant of geocentric conjunction of Moon and star in right ascension, expressed in Greenwich mean time;

$H$  = the Greenwich west hour-angle of the two bodies at that moment;

$\lambda$  = the longitude west of Greenwich;

$h_0 = H - \lambda$  = the local hour-angle of the star at the instant  $T$ ;

$\delta$  = the star's declination.

The procedure for each occultation will then be as follows:—

(1) The geocentric coordinates of the place,  $\rho \sin \varphi'$  and  $\rho \cos \varphi'$ , are to be computed by the formulæ and table given in connection with eclipses on page 724.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place, and that may be deduced from the time of geocentric conjunction by the application of an approximate correction taken from DOWNES'S table, printed in the volumes of the American Ephemeris for 1882 to 1899. This correction must be reckoned in mean solar hours, and will be designated by the symbol  $t$ . It will have the same sign as  $h_0$ .

When DOWNES'S table is not available, the correction may be computed from the formulæ—

$$\xi_0 = \rho \cos \varphi' \sin h_0$$

$$\xi' = [9.4192] \rho \cos \varphi' \cos \frac{4}{3} h_0$$

$$t = \frac{\xi_0}{\xi' - \xi_0}$$



By applying  $t$  to the Greenwich mean time of geocentric conjunction, as given with the elements, we shall have the Greenwich mean time of local conjunction within a few minutes.

(2) Compute for the instant  $T+t$  the following quantities, in which  $t_0$  is the sidereal equivalent of the mean time interval  $t$ :

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (h_0 + t_0) \\ \eta &= \rho \sin \varphi' \cos \delta - \rho \cos \varphi' \sin \delta \cos (h_0 + t_0) = \eta_1 - \eta_2 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos (h_0 + t_0) \\ \eta' &= [9.4192] \rho \cos \varphi' \sin \delta \sin (h_0 + t_0) = [9.4192] \xi \sin \delta \\ x &= x't \\ y &= Y + y't\end{aligned}$$

Compute also  $m$ ,  $M$ ,  $n$ ,  $N$ , and  $\psi$  from the equations,

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta' \\ \sin \psi &= [0.5646] m \sin (M - N)\end{aligned}$$

$\psi$  being taken between the limits  $\pm 90^\circ$ . Finally compute,

$$\begin{aligned}\tau &= -\frac{[1.7782]m}{n} \cos (M - N) \mp \frac{[1.2135]}{n} \cos \psi \\ \delta\tau &= \frac{[6.7591]\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)]\end{aligned}$$

where the double signs are to be taken negative for an immersion and positive for an emersion. Both  $\tau$  and  $\delta\tau$  thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively,  $\tau'$  and  $\delta\tau'$ , while those pertaining to emersion are designated  $\tau''$  and  $\delta\tau''$ . We then have for the Greenwich mean times of the phases,

$$\begin{aligned}\text{Instant of immersion} &= T + t + \tau' + \delta\tau' \\ \text{Instant of emersion} &= T + t + \tau'' + \delta\tau''\end{aligned}$$

These expressions are practically exact, as the corrections  $\delta\tau$  seldom amount to so much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute  $\xi$ ,  $\eta$ ,  $x$ , and  $y$  for the times of immersion and emersion finally obtained. If these times are correct, the quantities in question will fulfill the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2725$$

If  $\log m \sin (M - N) > 9.4354$ ,  $\sin \psi$  will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief one may occur if the excess of the computed distance over the Moon's semi-diameter happens to be within the errors of the ephemerides of the Moon and star.

The position-angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol  $P$ . It is computed from the formulæ—

$$\begin{aligned}P &= N - \psi + \delta P && \text{for immersion,} \\ \text{or } P &= N + \psi + \delta P \pm 180^\circ && \text{for emersion,}\end{aligned}$$



where the angles  $N-\phi$  and  $N+\phi$  are taken directly from the computation of  $\delta\tau$ , and  $\delta P$  is found in degrees of arc from the expression,

$$\delta P = \mp \frac{[7.3038]\tau^2}{\cos \phi} [\eta_2 \sin N + \xi \cos N]$$

In the latter formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex,  $V$ , is also reckoned in the direction from the north toward the east, and is found from the formula

$$V = P - C$$

where  $C$  is computed from the expression,

$$\tan C = \frac{\xi + [8.2218]\tau\xi' - [4.9810]\tau^2\xi}{\eta + [8.2218]\tau\eta' + [4.9810]\tau^2\eta_2}$$

$C$  being taken less or greater than  $180^\circ$ , according as the numerator is positive or negative.

The value of  $\tau$  employed in the latter formula must be so taken as to correspond with the phase for which  $C$  is required.

In the volumes of the American Ephemeris for the years 1882 to 1901 instructions are given for constructing three special tables which greatly diminish the labor of computing occultations, but as these tables should contain from 4700 to 6300 quantities, and as they would apply only to the place for which they were computed, it will rarely be worth while to undertake the labor of forming them. Those who desire further information on the subject may consult any one of the volumes in question.

As an example of an isolated occultation, we will compute that of 89 B. Leonis on March 6, 1917, for Evanston, Ill., whose position is—

$$\begin{aligned} \phi &= +42^\circ \quad 3' \quad 33''.4 \\ \lambda &= +5^h \quad 50^m \quad 42^s.3 \end{aligned}$$

and whose geocentric coordinates are—

$$\begin{aligned} \rho \sin \phi' &= 9.8237 \\ \rho \cos \phi' &= 9.8713 \end{aligned}$$

From the elements on page 576 we have,

$$\begin{aligned} T &= \begin{matrix} h & m \\ 17 & 10.0 \end{matrix} \\ H &= +6 \quad 13.6 \\ h_0 &= H - \lambda = +0 \quad 22.9 \end{aligned}$$

and

From the formulæ on page 730, we find the correction,  $t$ , to the Greenwich mean time of geocentric conjunction,  $T$ , to be about  $+0^h \ 14^m.4$ ; therefore the Greenwich mean time of apparent conjunction is—

$$T + t = \text{March } 6^d \ 17^h \ 24^m.4$$

89 B. Leonis.	Apparent Declination.	G. M. T. of $\odot$	Hour Angle.	$Y$	$z'$	$s'$
	+8 42.4	$\begin{matrix} d & h & m \\ \text{Mar. } 6 & 17 & 10.0 \end{matrix}$	$\begin{matrix} h & m \\ +6 & 13.6 \end{matrix}$	+0.7506	0.5032	−0.2220

$T+t$	Mar. 6 <sup>d</sup> 17 <sup>h</sup> 24 <sup>m</sup> .4	$x-\xi$	+0.0003
$h_0$	+ 0 22.9	$y-\eta$	+0.1497
$l_0$	+ 0 14.4	$x'-\xi'$	+0.3106
$h_0+l_0$	+ 0 37.3	$y'-\eta'$	-0.2268
$\rho \cos \varphi'$	9.8713	$m \sin M$	6.4771
$\sin (h_0+l_0)$	9.2096	$m \cos M$	9.1752
$\log \xi$	9.0809	$\tan M$	7.3019
$\xi$	+0.1205	$M$	0° 7'
$\rho \sin \varphi'$	9.8237	$\cos M$	0.0000
$\cos \delta$	9.9980	$\log m$	9.1752
$\log \eta_1$	9.8187	$n \sin N$	9.4922
$\eta_1$	+0.6587	$n \cos N$	9.3556 $n$
$\rho \cos \varphi'$	9.8713	$\tan N$	0.1366 $n$
$\sin \delta$	9.1801	$N$	126° 8'
$\cos (h_0+l_0)$	9.9942	$\sin N$	9.9072
$\log \eta_2$	9.0456	$\log n$	9.5850
$\eta_2$	+0.1111	const. log	0.5646
$\eta_1-\eta_2=\eta$	+0.5476	$\log m$	9.1752
const. log	9.4192	$\sin (M-N)$	9.9079 $n$
$\rho \cos \varphi' \cos (h_0+l_0)$	9.8655	$\sin \psi$	9.6477 $n$
$\log \xi'$	9.2847	$\psi$	-26° 23'
$\xi'$	+0.1926	const. log	1.7782
const. log	9.4192	$\log \frac{m}{n}$	9.5902
$\xi \sin \delta$	8.2610	$\cos (M-N)$	9.7694 $n$
$\log \eta'$	7.6802		1.1378 $n$
$\eta'$	+0.0048	$\frac{[1.7782]m}{n} \cos (M-N)$	+13.73
$\log x'$	9.7018	const. log	1.2135
$\log \epsilon$	9.8802	colog $n$	0.4150
$\log x$	9.0820	$\cos \psi$	9.9522
$x$	+0.1208		1.5807
$\log y'$	9.3464 $n$	$\mp \frac{[1.2135] \cos \psi}{n}$	$\mp 38.08$
$\log y't$	8.7266 $n$	$\epsilon$ for immersion	-24.35
$y't$	-0.0533	$\epsilon$ for emission	+51.81
$Y$	+0.7506		
$y$	+0.6973		

The computation of  $\delta\tau$  for the two contacts is as follows:

	Immersion.	Emersion.
$N\mp\psi$	152° 31'	99° 45'
$\cos (N\mp\psi)$	9.9480 $n$	9.2288 $n$
$\log \eta_2$	9.0456	9.0456
$\log (1)$	8.9936 $n$	8.2744 $n$
(1)	-0.0985	-0.0188
$\sin (N\mp\psi)$	9.6842	9.9937
$\log \xi$	9.0809	9.0809
$\log (2)$	8.7451	9.0746
(2)	+0.0556	+0.1187
(1)-(2)	-0.1541	-0.1375
$\log [(1)-(2)]$	9.1878 $n$	9.1383 $n$
const. log	6.7591	6.7591
$\log \tau^2$	2.7730	3.4288
colog ( $n \cos \psi$ )	0.4628	0.4628
$\log \delta\tau$	9.1827 $n$	9.7890 $n$

			Immersion.			Emersion.	
	$\delta r$			m		m	
	$r + \delta r$			— 0.15		— 0.62	
				— 24.50		+ 51.19	
	$T + t$	Mar.	d	h	m	h	m
Greenwich Mean Time of Phase,			6	17	24.4	17	24.4
		"	6	16	59.9	18	15.6
	$\lambda$			+ 5	50.7	+ 5	50.7
Evanston Mean Time		Mar.	6	11	9.2	12	24.9
To find $\delta P$ and $P$ :							
	$\log \eta_2$	9.0456		$\log \xi$	9.0809	(3)	+0.0897
	$\sin N$	9.9072		$\cos N$	9.7706 $n$	(4)	—0.0710
	$\log (3)$	8.9528		$\log (4)$	8.8515 $n$	(3)+(4)	+0.0187
	$\log [(3)+(4)]$			Immersion.		Emersion.	
	const. log			8.2718		8.2718	
	$\log r^2$			7.3038 $n$		7.3038	
	$\text{colog } \cos \psi$			2.7730		3.4288	
	$\log \delta P$			0.0478		0.0478	
	$\delta P$			8.3964 $n$		9.0522	
	$N \mp \psi$			.		.	
	constant			0.0		+0.1	
				152.5		99.8	
				0.0		180.0	
Angle of position, $P$				152.5		279.9	

from the north point of the Moon's limb toward the east, for direct image.

Pages 611–613 contain in detail all the data necessary for observing every occultation of the general list which is visible at Washington during the current year.

Page 614 contains the *Ephemeris for Physical Observations of the Sun*.

Page 615 contains certain elements referring to the Moon, its equator, and its orbit.

- $i$  = the inclination of the Moon's mean equator to the Earth's true equator.
- $\Delta$  = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.
- $\Omega'$  = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.
- $I'$  = the longitude of the perigee of the Moon's orbit, referred to the mean equinox of date.
- $\Omega$  = the longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.
- $\mathbb{C}$  = the Moon's mean longitude, referred to the mean equinox of date.

Pages 616–623 contain the *Ephemeris for Physical Observations of the Moon*. The selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean center of the visible disk positive toward the west—i. e., toward Mare Crisium—and the latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

The optical and physical librations in longitude and latitude have been computed with elements and formulæ given on page xiii, and their sums are given in the second and third columns, respectively, the physical libration being given separately in the fourth and fifth columns. The Sun's selenographic colongitude ( $90^\circ$ —longitude) and latitude and the position-angle of the Moon's axis,  $C$ , in the sixth, seventh, and eighth columns, respectively, have all been corrected for the effect of physical libration.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun,  $A$ , at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude,  $\lambda$  and  $\beta$ , are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by  $l_{\odot}$  and  $b_{\odot}$ , respectively:

$$\sin A = \sin b_{\odot} \sin \beta + \cos b_{\odot} \cos \beta \cos (l_{\odot} - \lambda)$$

Pages 624–625 contain the data with reference to the illuminated disks of Mercury and Venus. The angle  $\theta$  is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west, measured in the direction west, north, east, south. It is measured from  $0^{\circ}$  to  $360^{\circ}$ . We may also regard  $\theta$  as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

Pages 626–627 contain the *Ephemeris for Physical Observations of Mars*. The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

$P$  = the position-angle of the axis of rotation measured eastward from the north point of the disk.

$A_{\oplus}$ ,  $A_{\odot}$  = the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

$D_{\oplus}$ ,  $D_{\odot}$  = the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

$\odot_{\delta}$  = the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

$k$  = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

$i$  = the angle between the Sun and the Earth as seen from the planet.

$q$  = the angular value of the greatest defect of illumination as seen from the Earth.

$Q$  = the position-angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Mean Time of Transit of Zero Meridian* contain the Greenwich Mean Time of every transit of the zero meridian across the actual center of the disk.

Pages 628–631 contain the *Ephemeris for Physical Observations of Jupiter*.

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the disk, measured from the adopted zero meridian of System I and System II, respectively.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian to obtain the longitudes of the meridian bisecting the illuminated disk.

The column headed *Transit of Zero Meridian* contains the Greenwich mean time of every fifth transit of the zero meridian across the center of the illuminated disk.

The quantities in the remaining columns on pages 628–629 are the same as those defined under the *Ephemeris for the Physical Observations of Mars*.

Pages 632–657 contain, concerning the *Satellites of Jupiter*, the diagram of the orbits of Satellites I–V, the times of conjunction of Satellites I–IV, the times of elongation of Satellite V, the differences in right ascension and declination between Jupiter and Satellites VI and VII, and the phenomena of the Satellites I–IV together with their configurations.

Page 658 contains the *Magnitude of Saturn* and the *Elements of the Rings*.

$a, b$  = the major axis and minor axis, respectively, of the outer ellipse of the outer ring.

$P$  = the position angle of the northern semi-minor axis of the rings, measured from the north, positive towards the east.

$B$  = the Saturnicentric latitude of the Earth referred to the plane of the rings, positive towards the north.

$U+180^\circ$  = the Saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's equator.

$\omega$  = the distance in the plane of the rings from their ascending node on the Earth's equator to their ascending node on the ecliptic.

$B'$  = the Saturnicentric latitude of the Sun referred to the plane of the rings, positive towards the north.

$U'+180^\circ$  = the Saturnicentric longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

Pages 659–667 contain, concerning the *Satellites of Saturn*, the diagram of the orbits of the seven inner satellites, the times of elongation for the first eight satellites, the differences in right ascension and declination between Saturn and Phœbe, the ninth satellite, and tables for predicting the position-angles and distances from the center of the planet of the first eight satellites.

Page 668 contains the diagram of the orbits of the satellites of Uranus, together with the times of their elongations.

Pages 669–670 contain tables for predicting the position-angles and distances from the center of the planet of the satellites of Uranus and Neptune.

Page 671 contains the diagram of the orbit of the satellite of Neptune, together with the times of its elongations.

Pages 672–673 contain the *Phenomena*, or the configurations of the Sun, Moon, and planets, expressed in the symbols of page xx. The predicted times of the conjunctions, quadratures, and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by  $0^\circ$ ,  $\pm 90^\circ$ , or  $180^\circ$ . For the conjunction of the planets with the Moon and with each other, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus,  $\delta \text{ } \text{♄} \text{ } \text{♁} \text{ } \dots \text{ } \text{♄} - 4^\circ 22'$  would be read "Conjunction of Mars with the Moon, Mars  $4^\circ 22'$  to the South."

These pages contain also the beginning of the seasons; the perihelia and aphelia of the planets, including the Earth; the passage of the planets through the nodes of their orbits upon the ecliptic; and the date of lunar and solar eclipses, with their aspect as seen from Washington.

Pages 674–683 contain the *Positions of Observatories*, together with a list of the authorities from which the positions are obtained. The tabular arrangement is self-explanatory.

Page 684 contains two examples in the computation of lunar distances, which are inserted because lunar distance tables are no longer published.

Pages 685–709 contain a series of tables numbered from I to VII.

Table I—*For Finding the Latitude by an Observed Altitude of Polaris.*

Table II—*For converting Sidereal into Mean Solar Time.*

Table III—*For converting Mean Solar into Sidereal Time.*

Table IV—*For Finding the Azimuth of Polaris at All Hour Angles.*

Table V—*For Finding the Azimuth of Polaris at Elongation.*

Table VI—*For Finding the Times of Upper and Lower Culmination of Polaris.*

Table VII—*For finding the Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, of Polaris.*

39398°—1917—47



# INDEX TO APPARENT PLACES OF STARS, 1917. 789





# GENERAL INDEX.

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	Page.
Abbreviations . . . . .	xx
Aberration, Constant of . . . . .	xviii
of the Sun . . . . .	3
Achernar (Alpha Eridani), Apparent Place . . . . .	328
Mean Place . . . . .	217
Age of the Moon . . . . .	118
Alcyone (Eta Tauri), Apparent Place . . . . .	348
Mean Place . . . . .	219
Aldebaran (Alpha Tauri), Apparent Place . . . . .	354
Mean Place . . . . .	219
Algol (Beta Persei), Apparent Place . . . . .	343
Mean Place . . . . .	218
Alioth (Epsilon Ursæ Majoris), Apparent Place . . . . .	420
Mean Place . . . . .	224
Alkaid (Eta Ursæ Majoris), Apparent Place . . . . .	424
Mean Place . . . . .	224
Alpha Canis Majoris (Sirius), Apparent Place . . . . .	374
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Canis Minoris (Procyon), Apparent Place . . . . .	381
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Centauri, Apparent Place . . . . .	431
Mean Place . . . . .	225
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Ursæ Minoris (Polaris), Apparent Place . . . . .	232, 709
Mean Place . . . . .	231
Polaris Tables . . . . .	685
Alpheratz (Alpha Andromedæ), Apparent Place . . . . .	316
Mean Place . . . . .	217
Altair (Alpha Aquilæ), Apparent Place . . . . .	476
Mean Place . . . . .	228
Parallax . . . . .	xi
Anniversaries and Festivals . . . . .	xvi
Antares (Alpha Scorpii), Apparent Place . . . . .	448
Mean Place . . . . .	226
Aphelia of Planets . . . . .	672
Apogee of Moon . . . . .	117
Apparent Place of 2 Aquilæ, Example of Reduction to . . . . .	718
Places of 790 Standard Stars . . . . .	316
of 35 Circumpolar Stars . . . . .	232
of 825 Stars, Index to . . . . .	738
Arcturus (Alpha Boötis), Apparent Place . . . . .	428
Mean Place . . . . .	224
Ariel, First Satellite of Uranus . . . . .	668, 669, 670

	Page.
Arrangement and Use of the American Ephemeris . . . . .	711
Aspects of the Planets . . . . .	672
Astronomical Constants . . . . .	xviii
Azimuth of Polaris at all Hour Angles, Table IV . . . . .	696
at Elongation, Table V . . . . .	702
Beginning of the Seasons . . . . .	672
Bellatrix (Gamma Orionis), Apparent Place . . . . .	362
Mean Place . . . . .	220
Besselian Elements of Solar Eclipses . . . . .	560, 561, 562, 563
Formulæ for Star Reductions . . . . .	200
Star Numbers . . . . .	202, 214
Example of Reduction with . . . . .	718
Exclusive of short-period Terms . . . . .	214
Betelgeux (Alpha Orionis), Apparent Place . . . . .	367
Mean Place . . . . .	220
Brilliancy of the Planets, greatest (see Stellar Magnitude under each planet).	
Canopus (Alpha Argus), Apparent Place . . . . .	371
Mean Place . . . . .	220
Capella (Alpha Aurigæ), Apparent Place . . . . .	361
Mean Place . . . . .	220
Castor (Alpha Geminorum), Apparent Place . . . . .	380
Mean Place . . . . .	221
Charts of Solar Eclipses . . . . .	following pages 560, 562
Chronological Eras and Cycles . . . . .	xvii
Circumpolar Stars, Apparent Places . . . . .	232
Mean Places . . . . .	231
Conjunctions of Planets . . . . .	672
of Satellites . . . . .	633
Constants, Astronomical . . . . .	xviii
Culminations, Moon . . . . .	522
of Polaris, Table VI for finding times of . . . . .	708
Upper Culmination, Meridian of Greenwich, Table VII . . . . .	709
Cygni 61, Apparent Place . . . . .	487
Mean Place . . . . .	229
Parallax . . . . .	xi
Day, Civil and Astronomical . . . . .	712
Length of . . . . .	xviii
of Julian Period . . . . .	xvii
Delta Cassiopeiæ, Apparent Place . . . . .	326
Mean Place . . . . .	217
Used for finding time of culmination of Polaris (Table VI) . . . . .	708
Deneb (Alpha Cygni), Apparent Place . . . . .	483
Mean Place . . . . .	228
Denebola (Beta Leonis), Apparent Place . . . . .	412
Mean Place . . . . .	223
Dione, Fourth Satellite of Saturn . . . . .	650, 662, 664, 666
Disk of Mercury . . . . .	624
of Venus . . . . .	625
Distance, Astronomical Unit of . . . . .	xviii
of the Moon . . . . .	xviii
of the Planets (see also reference under each planet) . . . . .	xix
of the Sun . . . . .	xviii, 3
Dominical Letter . . . . .	xvii
Earth, Dimensions of . . . . .	xviii
Elements of Orbit of . . . . .	xix
Earth's Radius Vector, Logarithm of . . . . .	3
Easter, Date of . . . . .	xvi

	Page.
<b>Eccentricities of the Orbits of the Earth and Planets</b>	xix
<b>Eclipses, Solar and Lunar, Elements and Circumstances of</b>	556
Solar, Besselian Elements of	560, 561, 562, 563
Charts of	following pages 560, 562
Correction to Elements of	xii
Example of the Computation of	726
<b>Ecliptic, Obliquity of</b>	3
<b>Election Day, Date of</b>	xvi
<b>Elements of Planetary Orbits</b>	xix
<b>Elongations of Planets</b>	672
of Satellites	633, 660, 668, 671
<b>Elongation, Azimuth of Polaris at, Table V</b>	702
of Polaris, Time Interval from Upper Culmination, Table VII	709
<b>Enceladus, Second Satellite of Saturn</b>	659, 661, 664, 666
<b>Epact</b>	xvii
<b>Ephemeris for the Meridian of Greenwich (Part I)</b>	1-198
of Washington (Part II)	199-554
<b>Equation of Time for Greenwich Mean Noon</b>	2
for Washington Apparent Noon	514
<b>Equator, Moon's</b>	615
<b>Equinoxes, Date of</b>	672
<b>Errata</b>	viii
<b>Example of the Computation of Lunar Distances</b>	684
of Occultations	732
of Solar Eclipses	726
Reduction of Stars to Apparent Place	718
of the Sun	714
<b>Festivals, etc</b>	xvi
<b>Fomalhaut (Alpha Piscis Australis), Apparent Place</b>	508
Mean Place	230
<b>Geocentric Ephemerides of the Planets</b>	134
Latitude of Observatories, Reduction to	674
<b>Golden Number</b>	xvii
<b>Gravity, Acceleration due to</b>	xviii
Gaussian Constant of	xviii
<b>Greenwich Ephemeris (Part I)</b>	1-198
<b>Hayford's Spheroid</b>	xviii
<b>Heliocentric Coordinates of the Planets</b>	142
<b>Hyperion, Seventh Satellite of Saturn</b>	659, 662, 665, 667
<b>Iapetus, Eighth Satellite of Saturn</b>	659, 662, 665, 667
<b>Independent Star-Numbers</b>	206, 214
Example of Reduction with	719
Exclusive of short-period Terms	214
Formulae for	200
<b>Irradiation</b>	xiii
<b>Julian Period</b>	xvii
<b>Jupiter, Diameter, Apparent Equatorial</b>	629
Distance from Earth, logarithm of	174
Elements of Orbit of	xix
Ephemeris for Physical Observations of	628
Elements used	xiv
Greenwich, Transit of	174
Heliocentric Longitude and Latitude of	182
Horizontal Parallax of	174, 547
Radius Vector (Distance from Sun), logarithm of	182
Reduction to Orbit	182
Right Ascension and Declination at Greenwich Mean Noon	174
at Washington Transit	547

	Page.
Jupiter, Satellites, Diagram of Apparent Orbits of . . . . .	632
Synodic Periods of . . . . .	632
I, II, III, and IV, Phenomena and Configurations of . . . . .	636
Times of Superior Conjunction of . . . . .	633
Satellite V, Greatest Elongation of . . . . .	633
Satellites VI and VII, Differential Coordinates of . . . . .	635
Semidiameter, Adopted Constant of . . . . .	xix
Polar . . . . .	174, 547
Sidereal Time of, Passing Meridian . . . . .	547
Stellar Magnitude of . . . . .	547, 628
Washington Transit of . . . . .	547
Latitude, for finding, by an Observed Altitude of Polaris, Tables I, Ia . . . . .	685
Formula for Reduction to Geocentric . . . . .	xviii
Heliocentric, of the Planets . . . . .	142
of the Moon . . . . .	118
Corrections to . . . . .	xii
of the Sun . . . . .	3
Length of the Day . . . . .	xviii
of the Month . . . . .	xviii
of the Seconds Pendulum . . . . .	xviii
of the Year . . . . .	xviii
Libration of the Moon . . . . .	616
Light, Velocity of . . . . .	xviii
Longitude, Heliocentric, of the Planets . . . . .	142
Mean, of the Moon . . . . .	615
Nutation in . . . . .	3
of the Sun . . . . .	3
of the Moon, Corrections to . . . . .	xii
Precession in . . . . .	3
Short Period Terms of Nutation in . . . . .	215
True, of the Moon . . . . .	118
Lunar Distances, Examples in . . . . .	684
Magnitudes, Stellar, of Jupiter . . . . .	547, 628
of Mars . . . . .	548, 628
of Mercury . . . . .	624
of Neptune . . . . .	553
of Saturn . . . . .	549, 633
of Uranus . . . . .	551
of Venus . . . . .	625
Maps of Solar Eclipses . . . . .	following pages 550, 562
Markab (Alpha Pegasi), Apparent Place . . . . .	558
Mean Place . . . . .	230
Mars, Distance from Earth, logarithm of . . . . .	162
Elements of Orbit of . . . . .	xix
Ephemeris for Physical Observations of . . . . .	626
Elements used . . . . .	xiv
Greenwich Transit of . . . . .	162
Heliocentric Longitude and Latitude of . . . . .	170
Horizontal Parallax of . . . . .	162, 546
Occultation of . . . . .	594
Radius Vector (Distance from Sun), logarithm of . . . . .	170
Reduction to Orbit . . . . .	170
Right Ascension and Declination at Greenwich Mean Noon . . . . .	162
at Washington Transit . . . . .	546
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	162, 546
Sidereal Time of, Passing Meridian . . . . .	546
Stellar Magnitude of . . . . .	546, 626

	Page.
rs, Washington Transit of	546
ss of Planets	xix
an Places of 790 Standard Stars	217
of 35 Circumpolars	231
of Stars Occulted by the Moon	564
an Solar into Sidereal Time, Table III	693
rcury, Apparent Disk of	624
Distance from Earth, logarithm of	134
Elements of Orbit of	xix
Greenwich Transit of	134
Heliocentric Longitude and Latitude of	142
Horizontal Parallax of	134, 538
Radius Vector (Distance from Sun), logarithm of	142
Reduction to Orbit	142
Right Ascension and Declination at Greenwich Mean Noon	134
at Washington Transit	538
Semidiameter, Adopted Constant of	xix
Apparent	134, 538
Sidereal Time of, Passing Meridian	538
Stellar Magnitude of	624
Washington Transit of	538
ridian Passage of Jupiter	174, 547
of Mars	162, 546
of Mercury	134, 538
of Moon	118, 522
of Neptune	197, 553
of Saturn	184, 549
of Sun	514
of Uranus	193, 551
of Venus	150, 542
nas, First Satellite of Saturn	659, 660, 664, 696
na (Omicron Ceti), Apparent Place	335
Mean Place	218
nar (Zeta Urse Majoris), Apparent Place	422
Mean Place	224
Used for finding time of Culmination of Polaris (Table VI)	708
nth, Length of	xviii
on, Age of, Greenwich Mean Neon and Midnight	118
Apogee and Perigee	117
Bright Limbs	522
Corrections to the Long., Lat., and Hor. Parallax of the	xii
Culminations, upper and lower, Meridian of Washington	522
Distance from Earth, Mean	xviii
Eclipses of, Elements and Circumstances	556
Ephemeris for Physical Observations of	616
Formula used	xiii
Hourly	26
Equator, Position of	615
Libration, Formulæ for computing	xiv
Longitude and Latitude of	118
Formulæ for	ix
Longitude, Mean	615
True	118
Motion of, in Mean Longitude	615
Node, Mean Longitude of	615
Parallax for Greenwich Noon and Midnight	118
for Washington, upper and lower transit	522
Mean Equatorial Horizontal	xviii



	Page.
Parallax, Horizontal, of Uranus . . . . .	103, 551
of Venus . . . . .	150, 542
Solar, Constant of . . . . .	ix, xviii
Pendulum, Length of Seconds . . . . .	xviii
Perigee of the Moon . . . . .	117
Longitude of Moon's . . . . .	616
Perihelia of Planets . . . . .	xix, 672
Phases of Eclipses of Jupiter's Satellites . . . . .	637
of the Moon . . . . .	117
Phenomena, Eclipses, Occultations, Satellites, etc., Part III . . . . .	555
of Jupiter's Satellites . . . . .	636
Planetary Configurations . . . . .	672
Phœbe, Ninth Satellite of Saturn . . . . .	659, 663
Physical Observations of Jupiter, Ephemeris for . . . . .	628
of Mars, Ephemeris for . . . . .	626
of the Moon, Ephemeris for . . . . .	616
of the Sun, Ephemeris for . . . . .	614
Planetary Configurations . . . . .	672
Orbits, Elements of . . . . .	xix
Planets, Aspects of . . . . .	672
at Greatest Brilliancy (see Stellar Magnitude under each planet) . . . . .	
at Stationary Points . . . . .	672
in Ascending and Descending Node . . . . .	672
in Conjunction . . . . .	672
in Elongation . . . . .	672
in Opposition . . . . .	672
in Perihelion and Aphelion . . . . .	672
in Quadrature . . . . .	672
Occultations of . . . . .	570, 573, 576, 579, 594, 602
Semidiameters of . . . . .	xix
Signs of . . . . .	xx
Polaris (Alpha Ursæ Minoris), Apparent Place . . . . .	232, 709
Azimuth of, at All Hour Angles, Table IV . . . . .	696
Azimuth of, at Elongation, Table V . . . . .	702
for Finding the Times of Upper and Lower Culminations from Observations in Connection with Zeta Ursæ Majoris (Mizar), S. P. and Delta Cassiopeise, S. P., Table VI . . . . .	708
Mean Place . . . . .	231
Table I, for Determining Latitude by Observations of Polaris . . . . .	685
Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, Table VII . . . . .	709
Pole Star (see Polaris).	
Pollux (Beta Geminorum), Apparent Place . . . . .	382
Mean Place . . . . .	221
Precession, General . . . . .	xviii
in Longitude . . . . .	3
Procyon (Alpha Canis Minoris), Apparent Place . . . . .	381
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Quadrature of Planets . . . . .	672
Radius Vector of the Earth, logarithm of . . . . .	3
of the Planets, logarithm of . . . . .	142
Reduction of Sidereal to Solar Time, and <i>vice versa</i> , Tables II, III . . . . .	690
of Stars to Apparent Place, Formulæ for . . . . .	200
Example of . . . . .	718



	Page.
<b>Regulus (Alpha Leonis), Apparent Place</b>	399
Mean Place	222
<b>Rhea, Fifth Satellite of Saturn</b>	659, 662, 665, 667
<b>Rigel (Beta Orionis), Apparent Place</b>	360
Mean Place	229
<b>Rings of Saturn</b>	658
<b>Roman Indiction</b>	xvii
<b>Satellites of Jupiter</b>	632
of Neptune	670
of Saturn	659
of Uranus	668
<b>Saturn, Distance from Earth, logarithm of</b>	184
Elements of Orbit of	xix
Greenwich Transit of	184
Heliocentric Longitude and Latitude of	192
Horizontal Parallax of	184, 549
Occultation of	570, 573, 576, 579
Radius Vector (Distance from Sun), logarithm of	192
Reduction to Orbit	192
Right Ascension and Declination at Greenwich Mean Noon	184
at Washington Transit	549
Rings, Elements for Determining Geocentric Position of	658
Satellites, Diagram of Apparent Orbits of	659
Differential Coordinates of Phoebe	663
Greatest Elongations of	660
Names of	659
Synodic Periods of	659
Tables for Determining Position Angle and Distance	664
<b>Semidiameter, Adopted Constant of</b>	xix
Apparent Polar	184, 549
Sidereal Time of, Passing Meridian	549
Stellar Magnitude of	549, 658
Washington Transit of	549
<b>Schedir (Alpha Cassiopeie), Apparent Place</b>	320
Mean Place	217
<b>Seasons, Beginning of</b>	672
<b>Semidiameter of Jupiter</b>	174, 547
of Mars	162, 546
of Mercury	134, 538
of Moon	118, 522
of Neptune	196, 553
of Saturn	184, 549
of Sun	2, 514
of Uranus	193, 551
of Venus	150, 542
<b>Semidiameters of the Sun and Moon, Adopted Constants of</b>	xiii, xix
of the Planets, Adopted Constants of	xix
<b>Short Period Terms of Nutation</b>	215
in Star Numbers	200
<b>Sidereal into Mean Solar Time, Table II</b>	690
Noon, Greenwich Mean Time of	3
Time of Washington Mean Noon	514
or Right Ascension of Mean Sun	2
<b>Signs of the Zodiac</b>	xx
<b>Sirius (Alpha Canis Majoris), Apparent Place</b>	374
Mean Place	221
Orbit Position	xii
Parallax	xi

	Page.
Solar Cycle . . . . .	xvii
Ephemeris . . . . .	2, 514
into Sidereal Time, Table III . . . . .	693
Solstices . . . . .	672
Spheroid, Hayford's . . . . .	xviii
Spica (Alpha Virginis), Apparent Place . . . . .	422
Mean Place . . . . .	224
Stars, Apparent Places of 790 Standard . . . . .	316
of 35 Circumpolar . . . . .	232
Elements of Occultations . . . . .	569
Example of Reduction to Apparent Position . . . . .	718
Formulae for Reduction to Apparent Position . . . . .	xi, 200
Index to the Apparent Places . . . . .	738
Mean Places for Beginning of the Year, of 790 Standard . . . . .	217
of 35 Circumpolar . . . . .	231
of Stars Occulted by the Moon . . . . .	564
Occultations visible at Washington . . . . .	611
Star Numbers, Besselian and Independent, omitting short-period terms . . . . .	214
Besselian, including short-period terms . . . . .	202
Formulae used in Computing . . . . .	x, 200
Independent, including short-period terms . . . . .	206
Sun, Aberration of . . . . .	3
Constant of . . . . .	xviii
Coordinates, rectangular . . . . .	18
Formulae for . . . . .	ix
Distance from Earth, Mean . . . . .	xviii
Distance from Earth at Gr. Mean Noon, logarithm of . . . . .	3
Eclipses of, Charts . . . . .	following pages 560, 562
Elements and Circumstances of . . . . .	556, 672
Example of Computation of . . . . .	726
Ephemeris for Physical Observations of . . . . .	614
Formulae used . . . . .	xiii
Examples in the Reduction of . . . . .	714
Longitude and Latitude, Greenwich Mean Noon . . . . .	3
Mean, R. A. of, at Greenwich Mean Noon . . . . .	2
Parallax, Constant of . . . . .	ix, xviii
Horizontal . . . . .	2
R. A. and Decl. at Greenwich Mean Noon . . . . .	2
at Washington Apparent Noon . . . . .	514
Semidiameter, Adopted Constant of . . . . .	xiii, xix
Apparent . . . . .	2, 514
Sidereal Time of, Passing Meridian . . . . .	514
Symbols and Abbreviations . . . . .	xx
Synodic Month, Length of . . . . .	xviii
Periods of the Planets . . . . .	xix
Satellites . . . . .	632, 659
Terms of Short Period in the Nutation . . . . .	215
Tethys, Third Satellite of Saturn . . . . .	659, 661, 664, 666
Thanksgiving Day, Date of . . . . .	xvi
Time, Equation of, at Greenwich Mean Noon . . . . .	2
at Washington Apparent Noon . . . . .	514
Mean, of Greenwich Sidereal Noon . . . . .	3
Precepts for Conversion of . . . . .	712
Sidereal, of Greenwich Mean Noon . . . . .	2
of Washington Mean Noon . . . . .	514
Tables for Conversion of Sidereal to Solar and vice versa, Tables II and III . . . . .	690
Titan, Sixth Satellite of Saturn . . . . .	659, 662, 665, 667

	Page.
Titania, Third Satellite of Uranus . . . . .	668, 669, 670
Transit of the Moon . . . . .	118, 522
Transit of the Planets . . . . .	134, 538
Tropical Year, Length of . . . . .	xviii
Umbriel, Second Satellite of Uranus . . . . .	668, 669, 670
Unit of Distance, Astronomical . . . . .	xviii
Uranus, Distance from Earth, logarithm of . . . . .	193
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	193
Heliocentric Longitude and Latitude of . . . . .	195
Horizontal Parallax of . . . . .	193, 551
Radius Vector (Distance from Sun), logarithm of . . . . .	195
Reduction to Orbit . . . . .	195
Right Ascension and Declination at Greenwich Mean Noon . . . . .	193
at Washington Transit . . . . .	551
Satellites, Apparent Apsides of . . . . .	668
Diagram of Apparent Orbits of . . . . .	668
Greatest Elongations of . . . . .	668
Sidereal Periods of . . . . .	668
Tables for Determining Position Angle and Distance of . . . . .	669
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	193, 551
Sidereal Time of, passing Meridian . . . . .	551
Stellar Magnitude of . . . . .	551
Washington Transit of . . . . .	551
Vega (Alpha Lyrae), Apparent Place . . . . .	466
Mean Place . . . . .	227
Venus, Apparent Disk of . . . . .	625
Distance from Earth, logarithm of . . . . .	150
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	150
Heliocentric Longitude and Latitude of . . . . .	158
Horizontal Parallax of . . . . .	150, 542
Occultation of . . . . .	602
Radius Vector (Distance from Sun), logarithm of . . . . .	158
Reduction to Orbit . . . . .	158
Right Ascension and Declination at Greenwich Mean Noon . . . . .	150
at Washington Transit . . . . .	542
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	150, 542
Sidereal Time of, passing Meridian . . . . .	542
Stellar Magnitude of . . . . .	625
Washington Transit of . . . . .	542
Washington Ephemeris (Part II) . . . . .	199-554
Year, Length of . . . . .	xviii
Zeta Ursae Majoris (Mizar), Apparent Place . . . . .	422
Mean Place . . . . .	224
Used for finding time of Culmination of Polaris . . . . .	708
Zodiac, Signs of . . . . .	xx

